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PREPARATIONS FOR THE UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT ON THE BASIS OF GENERAL ASSEMBLY RESOLUTION 44/228 AND TAKING INTO ACCOUNT OTHER RELEVANT GENERAL ASSEMBLY RESOLUTIONS:

PROTECTION OF OCEANS, ALL KINDS OF SEAS INCLUDING ENCLOSED AND SEMI-ENCLOSED SEAS, COASTAL AREAS AND THE PROTECTION, RATIONAL USE AND DEVELOPMENT OF THEIR LIVING RESOURCES
(Section II, Chapter 9 of Agenda 21)

Report of the Secretary-General of the Conference

INTRODUCTION

1. This document was prepared in response to paragraph 6 of decision A/Conf.151/PC/L.22/Add.1/Rev.1 on Protection of Oceans, All Kinds of Seas Including Enclosed and Semi-Enclosed Seas, Coastal Areas and the Protection, Rational Use and Development of their Living Resources. The Preparatory Committee, at its third session, requested the Secretary-General of the

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Conference to submit at its fourth session, for its consideration, "revised options for Agenda 21 indicating the origin of proposals when they reflect the results of expert meetings, taking into account:

a. United Nations General Assembly Resolution 44/228.

b. The debate and the relevant decisions taken at the third session including the format of Agenda 21 and means of implementation as contained in A/Conf.151/PC/L.49.

c. The results of the Meeting of Experts on the Degradation of the Marine Environment from Land-Based Sources of Pollution and Activities in Coastal Areas, convened by UNEP.

2. In preparing this revision, the Secretariat has tried to retain the essential points of the debate and submissions during and after the third session of the Preparatory Committee, edited and reorganized as necessary to eliminate duplication and to make a concise and coherent document. Where there were unresolved issues, these have been indicated, with detail provided in the compilation document (A/Conf.151/PC/104). New material, particularly on means of implementation, has been added as requested by the Preparatory Committee. The explanatory notes at the end of the chapter explain the origins of the content of each paragraph with reference to previous documents.

3. As requested in paragraphs 2 and 3 of decision A/Conf.151/PC/L.22/Add.1/Rev.1, a separate report on control of the degradation of the marine environment by land-based activities is submitted as prepared by the Executive Director of the United Nations Environment Programme in document A/Conf.151/PC/113. The relevant results were not available in time for inclusion in their final form in this document.

4. The marine environment -- including the oceans and adjacent coastal areas -- forms an integrated whole that is an essential component of the global life support system, and a positive asset presenting opportunities for sustainable development. The United Nations Convention on the Law of the Sea (UNCLOS) provides the international framework within which to pursue the protection and sustainable development of the marine and coastal environment and its resources. This requires new approaches to ocean and coastal area management and development, at the national, regional and international levels, approaches that are integrated in content, and precautionary and anticipatory in ambit, as reflected in the following programme areas:

A. INTEGRATED MANAGEMENT AND SUSTAINABLE DEVELOPMENT OF COASTAL AREAS, EXCLUSIVE ECONOMIC ZONES AND [MARINE ECOSYSTEMS]

B. MARINE ENVIRONMENTAL PROTECTION

C. SUSTAINABLE USE AND CONSERVATION OF HIGH SEAS LIVING RESOURCES

D. SUSTAINABLE USE OF LIVING MARINE RESOURCES UNDER NATIONAL JURISDICTION

E. ADDRESSING CRITICAL UNCERTAINTIES FOR THE MANAGEMENT OF MARINE ENVIRONMENT AND CLIMATE CHANGE

F. STRENGTHENING INTERNATIONAL, INCLUDING REGIONAL COOPERATION AND COORDINATION

G. SUSTAINABLE DEVELOPMENT OF ISLANDS

PROGRAMME AREAS

A. INTEGRATED MANAGEMENT AND SUSTAINABLE DEVELOPMENT OF COASTAL AREAS, EXCLUSIVE ECONOMIC ZONES AND [MARINE ECOSYSTEMS].

Basis for Action

5. The coastal area is a band of diverse and productive habitats that is important for human settlements, development and local subsistence. More than half the world's population lives within 60 km of the shoreline, and this could rise to three quarters by the year 2020. Many of the world's poor are crowded in coastal areas, and coastal resources are vital for many indigenous peoples. The Exclusive Economic Zone (EEZ) is also an important area where the States manage the development and protection of natural resources for the benefit of their people. For small island States, these are the areas most available for development activities.

6. Despite efforts at national, regional and international levels, the current sector and discipline oriented approach to marine and coastal resources does not provide an effective framework for achieving sustainable development and coastal resources are being rapidly degraded.

7. Integrated coastal management should provide for the developing needs of coastal States based upon optimum ecologically sustainable resource use.

Objectives

8. By 1994, agree on guidelines for integrated coastal zone management and development drawing on existing experience, and by 2000 establish integrated planning management and development processes at national, regional and global levels, ensuring compatibility among sectoral activities for sustainable use of coastal zones and EEZs.

9. By 2000, adopt programmes for the establishment of protected areas and other measures to maintain species and their habitats and conserve biodiversity in coastal areas and EEZs.

10. By 1996, introduce new arrangements in regional bodies to ensure effective coordination in the fields of environmental protection, sustainable marine resource utilization and development with due regard to the needs of the population.

Activities

Management-Related:

11. Each coastal State should apply an integrated approach to planning and management in all coastal areas, particularly in those fragile inter-related ecosystems such as are found in island States, low-lying countries, and enclosed and semi-enclosed seas, to identify and deal with potential interactions, allocate resources, anticipate and avoid conflict, minimize environmental degradation and face the challenge of potential climate change.

12. Each coastal State should establish a high-level planning body or a national coordinating mechanism for integrated coastal and EEZ management and development involving the governmental, academic and private sectors, NGOs, indigenous peoples and local user groups, responsible for:

a. Formulating an appropriate policy and legal framework for land-use and siting policies, regulating access and rates of use, promoting environmentally sound technology and sustainable practices, excluding the harmful ones, making environmental impact assessment mandatory, and establishing liability and compensation provisions.

b. Preparation of coastal profiles identifying critical areas, management patterns and user conflicts.

c. Implementation of integrated master plans and programmes defining the roles and responsibilities of Governments, the private sector and users.

d. Environmental assessment programmes identifying causes of degradation and adoption of measures to prevent or correct such degradation.

e. Prior assessment of the adverse environmental impacts on the coastal environment and EEZ of major governmental policies, programmes and projects.

f. Improvement in coastal human settlements in developing countries, especially in housing and sewage treatment.

g. Contingency plans for man-induced and natural disasters, including likely effects of potential climate change and sea level rise.

h. Restoration of ecosystems, particularly altered critical habitats and/or living conditions of endangered species.

i. Sectoral programmes on sustainability in human settlements, tourism, fishing, ports and industries using or affecting the coastal area.

j. Management systems complementing the regulatory framework with economic instruments, including accounting systems for coastal resources, allocation schemes establishing explicit user's rights and fees, and shifting investments from overcapitalized activities to environmentally safe uses, habitat rehabilitation, infrastructure adaptation and alternative employment.

k. Public education and information programmes, together with non-governmental organizations.

13. Coastal States should preserve the biological diversity and productivity of marine species and habitats, and their ecological relationships, based on sound scientific and traditional information, through measures to:

a. Survey the marine biodiversity in waters under their jurisdiction.

b. Prepare an inventory of endangered species and critical coastal and marine habitats and, where appropriate, protect them through national legislation.

c. Establish and enforce protected areas in coastal and EEZ ecosystems with rare or fragile ecosystems, high biodiversity and productivity such as coral reefs, seagrass beds and mangrove forests, or having importance as breeding, spawning, nursery and recruitment areas and migratory stopover points.

d. Support scientific research on and systematic observation of resources of these marine areas and on marine biotechnology.

e. Implement national regulations to control the introduction of new species for aquaculture to avoid adverse effects.

f. Allow statutorily limited use of resources in protected areas if their use is sustainable and justified by tradition.

g. Include a marine biodiversity strategy in the global biodiversity convention, including a programme for identification and protection of fragile, critical and vulnerable coastal and oceanic habitats.

Data and Information:

14. Coastal States should increase their capacity to collect, use and disseminate information for prior assessments of adverse environmental impacts of major governmental and private policies, programmes and projects affecting the coastal and EEZ environment. Special assistance should be given to developing countries to:

a. Rationalize and expand the databases available in most countries for assessment and management of coastal areas and seas and their resources.

b. Create, assess and transfer technologies and geographic and other information systems, including databases, maps/charts, statistics and resource inventories to developing countries for storage and processing of data and for resources mapping, analysis and characterization.

c. Assess present status and problems of coastal zones, including inter alia eutrophication, coral bleaching, red tides, ciguatera, microbial contamination of beaches, nitrate enrichment and salinization of groundwater; fish abundance; habitat degradation; local and upstream impacting activities; and wetland destruction.

d. Develop socio-economic and environmental indicators.

e. Prepare inventories (atlases) of present and potential activities in the coastal areas to identify compatible or mutually exclusive activities as related to population trends.

f. Develop national capacities in risk analysis.

International and Regional Cooperation and Coordination:

15. International and regional organizations should:

a. Help countries develop planning, management and enforcement capacities for monitoring, control and surveillance.

b. Coordinate the harmonization of standards, formats and symbols to facilitate the widespread adoption of multi-purpose information systems for coastal and sensitive sea areas.

c. Establish regional networks for the sharing of information and project results, and for multi-disciplinary research and management of coastal and EEZ systems.

d. Set up regional coordinating mechanisms on coastal and EEZ development bringing together relevant international agencies, regional programmes, and donors.

e. Prepare guidelines for integrated management of coastal zones, EEZ's and marine ecosystems at local, national and regional levels.

Means of Implementation

Financing and Cost Evaluation:

16. The total cost for all countries to implement integrated management and sustainable development of coastal areas and EEZs is approximately $85 billion through the year 2000. The cost for developing countries would be approximately $50 billion, or about $6 billion per year for 1993-2000.[1]

17. Of the $6 billion annual costs about $50 million per year between 1993-2000 in catalytic funding is proposed to support programmes for integrated management and sustainable development of coastal areas. Of this, $36 million is proposed to assist developing countries with technical cooperation and training for institutional strengthening, improvement of databases, upgrading of research and management capacity, implementation of pilot and demonstration projects and production of detailed operational guidelines, plus $6 million to address global issues. $8 million is proposed to help strengthen international and regional organizations in this field.

Scientific and Technological Means:

18. Regional and international institutions should support States in the development of the required coastal monitoring, research mechanisms and institutions and information management systems, especially in developing countries and island States, as described in the activities above.

19. States and international and regional organizations should develop and transfer environmentally safe technologies and methodologies for development of coastal and marine areas.[2]

Human Resource Development:

20. Coastal States with the assistance of relevant regional and international institutions and donors and with the participation of local and regional centres, should organize training on integrated coastal and EEZ management for scientists and managers, and extension programmes for resource users including community leaders, indigenous peoples, fishermen and women.[3] Ocean and coastal area management and development concerns and local planning issues should be incorporated in educational curricula and public awareness campaigns, with due regard to traditional ecological knowledge.

Capacity Building:

21. States should:

a. Create an interministerial mechanism for policy-making and long term planning on EEZ and coastal areas as part of national frameworks for collaboration, integration and communication among sectors in a country and possibly among countries in a region.

b. Rationalize and/or coordinate sectoral programmes and restructure and simplify governmental institutions responsible for the development and protection of coastal areas, EEZ's and marine ecosystems.

c. Establish advisory bodies for broad consultation on coastal issues with local administrations, the business community, the academic sector, user groups and the general public.

d. Progressively introduce or strengthen systems of land and sea tenure, regulating access, users's rights and rates of use.

e. Include capacity building in agreements between development aid bodies and developing country institutions.

22. International and regional organizations should cooperate with coastal countries to:

a. Identify existing capabilities, facilities and needs for human resources development, the scientific and technological infrastructure required and potentials for expansion in regional marine and coastal areas research, training, management and technologies.

b. Establish and maintain regional centres capable of assisting countries in analyzing information and assessing the principal marine environmental problems, in reinforcing surveillance and in implementing environmental impact assessment and monitoring programmes with predictive capabilities.

c. Prepare national and regional contingency and emergency plans.

d. Support pilot demonstration projects in integrated coastal management.

B. MARINE ENVIRONMENTAL PROTECTION

Basis for Action

23. Degradation of the marine environment can result from a wide range of activities on land, either from a lack of, or an excess of, economic and industrial growth. Human populations, land use, agriculture, forestry, fisheries, urban development, tourism and industry can affect the marine environment.

24. Of the land-based sources of marine pollution, 40% arrives via rivers and 30% via the atmosphere, while maritime and dumping activities contribute 10% each. Contaminants which pose the greatest threat to the marine environment are sewage, nutrients, synthetic organic compounds, sediments, litter and plastics, metals, radionuclides, oil/hydrocarbons, and polycyclic aromatic hydrocarbons (PAH's).

25. An anticipatory rather than a reactive approach is necessary to protect the marine environment, requiring adoption of precautionary measures, environmental impact assessments, clean production techniques, waste audits and minimization, improved sewage treatment, quality criteria for classified substances, and a comprehensive approach to damaging impacts from air, land and water. Any management framework must include the improvement of coastal human settlements and the integrated management and development of coastal areas. These are covered elsewhere in Agenda 21.

26. Marine pollution is also caused by shipping and sea-based activities. Of the approximately 600,000 tons of oil entering the oceans each year, most is discharged as a result of normal shipping operations and less than a quarter is from major accidents. There is currently no global regulatory regime for the prevention and control of pollution from offshore oil activities and only five regions have considered the adoption of legal instruments in this regard. Many other chemicals carried by sea are intrinsically far more harmful. Altogether about half of the total dry cargo and liquid substances carried by sea consists of materials dangerous for the marine environment.

27. In addition to pollution, many development activities directly and indirectly degrade marine resources, such as industrial, residential, tourism and recreational development in natural habitats; conversion of mangroves; dredging; construction of dams and coastal infrastructure; and erosion from unsustainable agriculture and forestry.

Objectives

28. To protect the marine environment against the adverse effects of human land-based and sea-based activities so as to preserve development options, to conserve marine ecosystems and to safeguard human health while providing for rational use of living and non-living resources. In so doing, it is necessary to:

a. Ensure the proper integration of environment and development concerns.

b. Recognize the difficulties of developing countries in implementing such strategies.

c. Coordinate, integrate and develop appropriate local, national, regional and global mechanisms and policies.

29. Some specific objectives include:

a. By 1994, adopt a global strategy, programme of action and management framework to protect the marine environment against the adverse effects of land-based activities, with close links to regional conventions and action plans.

b. By 1995, strengthen and develop national and regional integrated action plans, such as the Regional Seas Programmes, agree on regional legally-binding agreements where they do not already exist and improve cooperation and coordination among regional activities.

c. By 1997, complete inventories and hazard assessments of marine pollution sources and update national, regional and global assessments of the state of the marine environment.

d. By 1998, establish a global network of contingency plans and response centres for marine pollution accidents.

e. By 1997, establish port waste reception facilities in sensitive sea areas.

f. By 1995, develop an international regulatory framework for offshore activities.

Activities

Management-Related:

PREVENTION, REDUCTION AND CONTROL OF DEGRADATION OF THE MARINE ENVIRONMENT FROM LAND-BASED ACTIVITIES [4]

30. States in cooperation with international and regional organizations should develop a concerted approach to land-based activities damaging the marine environment through the following incremental steps:

a. Agreed principles and programmes, building on the existing Montreal Guidelines, with the appropriate funding and technical support where applicable, at the national, regional and global levels, including possible establishment of appropriate standards.

b. A formal declaration or charter.

c. A global strategy including regional programmes to apply the principles and standards, including specific elements for an action plan, with provisions for institutional machinery.

31. States and appropriate international organizations should therefore implement the global strategy recommended by the Halifax and UNEP Intergovernmental Meetings of Experts (A/CONF.151/PC/...) in order to finalize and adopt a costed and targeted programme of action.[5]

32. Coastal states should establish regional and national action plans, including reduction programmes for inputs from land-based activities into the marine environment to achieve acceptable quality standards, together with target dates and financial mechanisms taking account of national and regional differences. Countries should adopt precautionary approaches to development and management, involving a reduction of effluents and emissions, through, inter alia, economic measures, improved housekeeping practices, greater treatment and recycling, the introduction of cleaner production technologies, and restoration of degraded habitats. Priorities for both developed and developing countries, are given below.

33. As concerns sewage, priority actions include:

a. Building and maintaining sewage treatment facilities in accordance with national policies, capacities and international cooperation available.

b. Controlling entry of non-domestic effluent containing contaminants (such as heavy metals) into sewers, allowing productive uses of sewage and environmentally sound co-treatments of domestic and compatible industrial effluents.

c. Subjecting municipal sewage discharged to rivers, estuaries and the sea to at least primary treatment, or to other solutions appropriate to specific sites.

d. Locating coastal outfalls so as to avoid exposing shell fisheries, water intakes and bathing areas to pathogens.

e. Cooperative development of minimum sewage effluent guidelines and water quality criteria.

f. Formulating or reviewing human settlement plans taking into account sewage concerns, including resettlement from heavily populated coastal and riverbank areas.

g. Establishing regulatory and monitoring programmes to control effluent discharge.

34. As concerns wastes, the main elements to be considered by countries are:

a. Establishment of regulatory and monitoring programmes to control effluent discharge, using appropriate risk and environmental impact assessments.

b. Adoption of prior notification and consent procedures at national and regional levels for controlling the input of point source pollutants which may cross national boundaries.

c. Reduction or elimination of the use of chemicals such as some synthetic organic compounds which threaten to accumulate to dangerous levels in the marine environment.

d. Quantification of the fluxes of nitrogen and phosphorus to and through the coastal zone as a basis for control measures, taking into account different national capacities and marine conditions.

e. Assistance to developing countries and countries with economies in transition, through financial and technological support, to maximize best practicable control and reduction of substances and wastes that are persistent, bio-accumulative or toxic, and to establish environmentally-sound land-based waste disposal systems to replace sea-dumping.

35. As concerns pollution from non-point sources:

a. Cooperation in the development of land-use techniques, particularly buffer zones, along estuaries and water courses to limit agricultural runoff;

b. Promotion through international development organizations and industry of the use of environmentally sound pesticides and fertilizers meeting minimum environmental toxicity and bio-accumulation standards.

c. Adoption of new initiatives at national and regional levels for controlling the input of non-point source pollutants, including sediments, which require broad changes in sewage and waste management, agricultural practices, mining, construction and transportation.

d. Regional programmes for controls on air pollutants shown to have a significant impact on the marine environment.

PREVENTION, REDUCTION AND CONTROL OF DEGRADATION OF THE MARINE ENVIRONMENT FROM SEA-BASED ACTIVITIES

36. Coastal States and States involved in shipping and dumping, in cooperation with IMO and other international and regional organizations, should:

a. Support wider ratification and implementation of the relevant conventions and protocols including the London Dumping Convention and finalization of its future strategy by 1994.

b. Extend existing regimes to cover pollution caused by substances other than oil.

c. Agree to stop the ocean dumping and incineration of all hazardous substances.

d. Develop an international regulatory framework for safety, waste disposal and pollution from offshore oil activities.

e. Develop liability and compensation regimes covering pollution damage from shipping and dumping activities, including a new regime for hazardous and noxious substances carried by ships.

37. As concerns shipping, coastal States should:

a. Enforce discharge provisions of the marine pollution conventions and MARPOL regulations more rigorously, such as through port state control and aerial surveillance.

b. Implement more stringent pollution control measures in particularly sensitive sea areas.

c. Adopt rules on ballast water dumping to prevent the spread of non-indigenous organisms.

d. Improve shipping safety including adequate charting of coasts.

38. In relation to ports, countries should:

a. Establish port facilities for the collection and disposal of waste oil, chemical residues and garbage, especially in sensitive sea areas where ships are not permitted to make discharges, and including smaller scale facilities in marinas and fishing harbours. This should be facilitated by adequate funding.

b. Adopt regulations, in accordance with the London Dumping Convention and MARPOL provisions, for dredging of navigation channels and disposal of dredged material, including global criteria for ocean disposal of contaminated spoils.

c. Develop guidelines for environmental impact assessments of port development.

d. Expand and enforce more widely the codes of practice relating to transportation of hazardous and dangerous cargoes, and for detection of illicit movement of toxic chemicals and hazardous wastes.

e. Use the provisions of the Basel Convention to prevent its parties from exporting, for disposal into the ocean, substances referred to in Annexes I and II of the London Dumping Convention.

39. States should develop oil and chemical spill contingency plans at local, national and regional levels and establish, at the national level, government/industry collaboration on provision of oil spill response materials and equipment stockpiles and on training of cleanup personnel, together with a funding mechanism.

40. States should establish a network of regional oil/chemical spill response centres with collaboration from IMO, regional programmes and organizations.

41. Appropriate United Nations agencies should prepare global guidelines concerning waste audits and clean production, and lists of substances and wastes prohibited from dumping at sea and should assist States to enter into regional agreements in this regard.

Data and Information:

42. States should regularly report information on pollutants and efforts to control and prevent them to relevant regional and international organisations.

43. States should make systematic observations of marine pollution and cooperate through relevant regional and international organisations in integrated assessments, monitoring and control of damage to the marine environment by:

a. Preparing or completing a global inventory of land-based and sea-based sources of marine pollution and databases on their effects.

b. Assessing the ecological, social and economic significance and impact of these sources and determining national, regional and global problems and priorities in controlling the sources.

c. Expanding marine pollution information in GIS mapping and information systems.

d. Making data on marine pollution available to interested parties and storing them at World Data Centres and other international data sources.

e. Supporting and expanding international programmes for systematic observations such as the mussel watch (sentinel organisms monitoring) programme and the Global Ocean Observing System, building on existing facilities.

f. Relating monitoring activities to action plans and pollution control and abatement strategies.

g. Establishing a clearinghouse on marine pollution control information.

International and Regional Cooperation and Coordination:

44. States with the support of international organizations should adopt an international land-based pollution agreement with effective provisions for financing and the development, use and transfer of environmentally sound technologies.[6]

45. Countries and international organizations should develop comparable monitoring techniques, methodologies, and measurements for all aspects of marine pollution, building on existing cooperation between UNEP, IOC, IAEA, IMO, UNIDO, FAO and WHO.

Means of Implementation

Financing and Cost Evaluation:

LAND-BASED ACTIVITIES

46. Since many activities on land have impacts on the marine environment, the cost estimates to control the major sources of pollution and other impacts are very high. A crude extrapolation based on a few regional studies in semi-enclosed seas gives figures ranging from $5-20 billion per year over 20 years for the necessary investments.[7] On the other hand, the benefits gained from protecting major economic activities in marine and coastal areas far outweigh the costs in the regions studied. Mechanisms such as user fees and charges for pollution violations are needed to raise the necessary sums from those most directly concerned and best able to bear the costs, and to channel the revenues into construction and operation of the necessary facilities. For technical cooperation with developing countries to implement Agenda 21 activities, the following amounts are proposed: $14 million in direct

assistance, $4 million to address global issues and $2 million to strengthen international organizations, for a total of $20 million per year. This amount needs to be complemented by major activities contained in other programme areas.[8]

SEA-BASED ACTIVITIES

47. An estimated $84 million per year is needed to build waste reception facilities in ports in developing countries. This will require special funding mechanisms such as loans or grants from international agencies, including the Global Environmental Facility or a system of "Reception Facility Funds", with the assistance of IMO. Income should be raised from shipping to cover at least the operation and maintenance of these facilities, if not to reimburse the capital investment.[9]

48. Provision of oil spill response materials and equipment, apart from the larger countries that have already invested hundreds of millions of dollars in stockpiles, is estimated at $50 million per year from 1993 to 2000. To this should be added $40 million per year for technical cooperation and capacity building in developing countries, all with reference to global issues, including $6 million to strengthen international organizations.[9]

Scientific and Technological Means:

49. National and regional action programmes will require technological cooperation, technology transfer, and financial resources, including:

a. Assistance to industries in identifying and adopting clean production or pollution control technologies.

b. Development and application of low-cost and low-maintenance sewage treatment technologies for developing countries.

c. Equipment of laboratories to observe systematically human impacts on the marine environment.

d. Identification of appropriate oil spill control materials, including low-cost locally-available materials and techniques, suitable for pollution emergencies in developing countries.

Human Resources Development:

50. States in cooperation with regional and international organizations should:

a. Provide training for marine scientists, marine laboratory technicians and hydrographic surveyors at the national or regional level.

b. Introduce marine environmental protection topics into the curriculum of marine academies.

c. Establish training courses for oil and chemical spill response personnel, in cooperation with the oil and chemical industries.

d. Conduct workshops on environmental aspects of port operations and development.

e. Strengthen and provide secure financing for new and existing specialized international centres of professional maritime education.[10]

Capacity Building:

51. National planning and coordinating bodies should be given the capacity and authority to review all land-based activities and sources of pollution for their impacts on the marine environment and to propose appropriate control measures.

52. All countries or regions, with the support of international and regional organizations, should strengthen and develop research facilities for systematic observation of marine pollution, environmental impact assessment and development of control recommendations, managed and staffed by local experts.

53. Special arrangements will be needed to provide adequate financial and technical resources to assist developing countries to prevent and solve problems associated with activities that threaten the marine environment.

54. An international funding mechanism should be created for the application of appropriate sewage treatment technologies and building sewage treatment facilities, including grants or concessional loans from international agencies and appropriate regional funds, replenished at least in part on a revolving basis by user fees.[11]

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UNRESOLVED ISSUES

55. [Note from the UNCED Secretariat:

The following issues were unresolved during PrepCom III and will require continuing consultations during PrepCom IV to prepare an acceptable text for inclusion. For the programme areas on Living Marine Resources, in the absence of a decision whether to consider all living marine resources together or separately under high seas and under national jurisdictions, the secretariat has treated them separately, assuming that it would be easier to combine them than to separate them. For the other unresolved issues below, the texts as they were left at the end of PrepCom III can be found in the Compilation Document (A/CONF.151/PC/104) as indicated for each issue.]

[C and D. LIVING MARINE RESOURCES or
C. SUSTAINABLE USE AND CONSERVATION OF HIGH SEAS LIVING RESOURCES
and
D. SUSTAINABLE USE OF LIVING MARINE RESOURCES UNDER NATIONAL JURISDICTION]

56. [Unresolved issue on high seas living resources: State obligation for flag vessels and violations of regulations. Corresponds to paragraphs 87 and 88, Annex I and II of the Compilation Document. An additional option is presented in Annex III in the Compilation Document.]

57. [Unresolved issue on high seas living resources: Straddling stocks and highly migratory species. Corresponds to paragraphs 69, 92, and 93, Annex I and II of the Compilation Document. An additional option is presented in Annex III in the Compilation Document.]

58. [Unresolved issue on high seas living resources: Development of international control, surveillance and enforcement systems. Corresponds to paragraph 96b, Annex I and II of the Compilation Document. An additional option is presented in Annex III in the Compilation Document.]

59. [Unresolved issue: Marine mammals. Corresponds to paragraph 81, Annex I of the Compilation Document. An additional option is presented in Annex III in the Compilation Document.]

60. [Unresolved issue: Polar regions. Corresponds to paragraph 82, Annex I and II of the compilation document.]

* *

C. SUSTAINABLE USE AND CONSERVATION OF HIGH SEAS LIVING RESOURCES

Basis for Action

61. High seas fisheries represent five per-cent of the world total landings. Despite efforts to manage fisheries sustainably on the high seas, management performance has not always been adequate and several resources are overutilized. There are inadequacies in biological knowledge, fishery statistics and international enforcement of management measures.

62. High seas fisheries should be developed and managed through ecosystem, multi-species approaches, incorporating environmental factors and ecologically sound practices consistent with the best available scientific information. Their performance should be monitored and regulations enforced, in order to preserve their biological diversity and productivity, maintain their ecological relationships and promote their optimum utilization. Populations should be kept at or restored to the level at which its recruitment ensures the greatest net annual increment and should be harvested in areas and at the stage of the life cycle that ensure maximum socio-economic efficiency. Endangered species and stocks should be restored and protected.

Objectives

63. By the year 2000, reinforce, further develop and implement a comprehensive set of regional and international management mechanisms and strategies to promote sustainable use and conservation of high seas living resources.

64. To achieve full implementation of General Assembly Resolution 44/225 on large-scale pelagic driftnet fishing.

Activities

Management-Related:

65. States with the support of international agencies should establish regional fisheries management bodies to fill the gaps in the existing coverage of the world's oceans.

66. High seas fishing States and coastal States, in conjunction with relevant international organizations and existing regional and international mechanisms, should reinforce their cooperation to conserve and make full sustainable use of the living marine resources of the high seas and to improve the status of those which are depleted, by:

a. Defining appropriate fisheries management units, for instance based on large marine ecosystems concepts, within the framework of the United Nations Convention on the Law of the Sea.

b. Cooperating with and acceding to competent international or regional organisations or other international arrangements.

c. Where arrangements do not exist, cooperating to establish appropriate international or regional agreements among States whose nationals or vessels fish in the same area or for the same resources.

d. Establishing appropriate exploitation and control regimes for highly migratory species and for stocks whose life cycles encompass both the high seas and EEZ's in conformity with the relevant provisions of the United Nations Convention on the Law of the Sea.

e. Assessing fishing practices, prohibiting non-sustainable ones, and developing and promoting fishing practices and selective gear which minimize adverse impacts on target and non-target species, other users and marine ecosystems.

67. States should effectively monitor and control fishing activities of their nationals' vessels and crews to ensure the conservation of the resources, compliance with applicable conservation and management rules, complete and accurate reporting of catches and effort, and minimisation of incidental catch.

68. States should develop multilateral guidelines dealing with the linkages between trade and the protection and sustainable use of living marine resources.

Data and Information:

69. States with the cooperation of international and regional organisations should:

a. Make available data and information adequate for fisheries assessment, including verifiable catch and effort statistics.

b. Develop and share analytical and predictive tools such as stock assessment and bioeconomic models to assist in risk management and decision-making in data-limited situations involving uncertainty and irreversibility.

c. Acquire all the data, current and historic, necessary for effective management of fisheries resources including data on catch and effort, by-catch and the impact of fishing on other users and the marine environment.

70. States, international and regional organizations should therefore establish or expand appropriate monitoring and assessment programmes for high seas living resources, including the standardized collection and joint analysis of scientific data and the deployment of scientific observers, concerning resource conditions, the effects of uses and management regimes, and the impacts of regional and global changes including climate change.

International and Regional Cooperation and Coordination:

71. Relevant international organizations should develop guidelines for better implementation of the provisions of the Law of the Sea Convention (UNCLOS) on high seas fisheries.

72. Countries within the framework of regional fisheries bodies and with the assistance of FAO and other international agencies should assess high seas resource potentials, inventory all stocks (target and non-target), establish optimal fishing regimes and acceptable levels of exploitation, and propose rehabilitation measures when necessary.

73. Collaboration should be strengthened between regional and international fishery bodies and with other organizations dealing with utilisation, conservation and management of the oceans and seas.

74. Cooperative and coordinated research programmes are needed to provide the knowledge necessary to manage high seas resources.[12]

75. International technical cooperation mechanisms in relation to marine commodities should be strengthened to identify and eventually eliminate inappropriate trade barriers and to assist in preventing the evasion of international management regimes.

Means of Implementation

Financing and Cost Evaluation:

76. The costs of developing sustainable uses of high seas resources should be borne by utilizing countries. The principal costs of research and management systems in the high seas should also be supported by the States and the various users. However, the catalytic funding required to improve the database and scientific knowledge, the effectiveness of fisheries management bodies, and the participation of all coastal countries, especially developing ones, in this effort is estimated at $12 million per year for this global issue, including $5 million to strengthen international and regional organizations.[13]

Scientific and Technological Means:

77. There is a critical need to develop international databases on resources and fisheries, including GIS and atlases. The high seas environment should be covered by the planned Global Ocean Observing System, but this data will need to be correlated with the resource and fisheries data. Coastal States with interests in the high seas should participate in regional or ocean-wide cooperative research programmes. Computerized and close to real-time fleet monitoring systems should be developed from existing systems. Simulation models dealing with multispecies resources and management under uncertainty should be developed further.[14]

Human Resources Development:

78. Human resources development should be targeted at both development and management of high seas resources, training entrepreneurs in high seas fishing, upgrading managers in high seas and environmental issues, developing a core of scientists to assess high seas resources, and preparing observers to be placed on fishing vessels.

Capacity Building:

79. States, regional and international organizations should develop or upgrade systems and institutional structures for monitoring, control and surveillance as well as the research capacity for strategic assessment.

80. Countries and regional fisheries management organizations, with the assistance of relevant United Nations Agencies, should strengthen research programmes dealing with high seas straddling or highly migratory resources, particularly when such species are exploited also within the EEZ's.

D. SUSTAINABLE USE OF LIVING MARINE RESOURCES UNDER NATIONAL JURISDICTION

Basis for Action

81. World oceans yield about 80-90 million tons per year of fisheries products, 95% of which comes from EEZs. They provide food and livelihoods to millions of coastal people including indigenous people. However, many

countries face mounting problems related to their rights and obligations under UNCLOS, including local overfishing, poor management performance, unauthorized incursions by foreign vessels, ecosystem degradation, increased stock fluctuations, overcapitalization, excessive fleet sizes, inefficient or unselective gear, unreliable data bases and inadequate information about their resource base, and increasing competition between artisanal and industrial fishing and between fishing and other types of activities. Access to the surplus of the allowable catch is often denied to other states whose nationals have habitually fished in the zone, in contradiction to the principles of UNCLOS.

82. Problems extend beyond fisheries. Coral reefs and other coastal habitats such as mangroves and estuaries are among the most highly diverse, integrated and productive of the earth's ecosystems. They often serve important ecological functions, provide coastal protection, and are critical resources for food, energy, tourism and economic development. In various parts of the world such coastal systems are under stress or threatened.

83. Marine resources and fisheries should be developed and managed through ecosystem, multi-species and integrated coastal management approaches, incorporating environmental factors and conservation requirements consistent with the best available scientific and sound traditional information. Their performance should be monitored and regulations enforced, in order to preserve their biological diversity and productivity, maintain their ecological relationships and promote their optimum utilization. Populations should be kept at or restored to the level ensuring the greatest net annual increment and should be harvested in areas and at the stage of the life cycle that ensure maximum socio-economic efficiency. Endangered species and stocks should be restored and protected.

84. The sustainable use and conservation of marine living resources is of social, economic and nutritional importance and contributes to national food security. The use of marine species for human food should be increased by promoting direct consumption, avoiding wastage and improving techniques of harvest, handling and transportation.

Objectives

85. By 1995, establish national mechanisms for integrated assessment, development and management of living marine resources.

86. By 1998, complete national living resource and critical habitat inventories of coastal areas and EEZs.

87. By 2000, prepare national strategies for mariculture and coastal aquaculture development in all developing countries.

88. By 1996, develop active programmes to stimulate local level fisheries management.

89. By 1996, ensure that coastal States obtain full economic benefits from the sustainable use of the marine resources of the EEZs and to secure access to surplus of allowable catch in EEZ's in accordance with UNCLOS.

90. Integrate protection and sustainable management of coral reefs and other critical ecosystems into living resources and coastal zone management strategies.

Activities

Management-Related:

91. National marine resources policy, legal and regulatory frameworks should be completed, with the assistance of relevant international and regional organizations, to improve enforcement capacity, investment and financing (including joint venture agreements), regulate access, enhance small-scale fisheries, improve seafood quality and rationalize trade.

92. Specifically, coastal States, with assistance as appropriate from international and regional organizations, should:

a. Establish systems to regulate access through licensing, user's rights, limited entry, space allocation, closure zones and economic instruments, while allocating marine resources equitably among small-scale, large-scale and sport fisheries and non-fishery users.

b. Assess fishing methods, prohibit non-sustainable ones, and promote fishing practices and selective gear which minimize adverse impacts on target and non-target species, other users and marine ecosystems.

c. Adopt domestic and international collaborative mechanisms on issues related to migratory fish and long range fleet monitoring and control.

d. Enhance the productivity and utilization of their marine living resources for food and income from food products, pharmaceutical products, and tourism, recreational, cultural and aesthetic uses.

e. Establish programmes to improve handling and processing, reducing post-harvest losses and discards and improving seafood quality.

f. Agree on global quality assurance systems for seafood in order to improve consumer confidence and maximize economic returns.

g. Develop mariculture and coastal aquaculture potentials based on national analyses for potential mariculture, coastal aquaculture (areas, species and methodologies) and other improvements, in the framework of integrated national planning.

h. Develop deep-sea fishing in developing countries where coastal resources are overfished and where scientific assessment shows resources are potentially available.

i. Promote non-consumptive uses of vulnerable or endangered living resources consistent with their conservation, such as eco-tourism, in replacement of consumptive uses.

93. At the local level, coastal States should:

a. Integrate small-scale fisheries and aquaculture development in coastal zone planning, and encourage representation of fishermen, women, indigenous people and communities in planning management bodies.

b. Increase rights and responsibilities of community-based users, including traditional coastal communities, women's groups and minorities/indigenous people, for management and enforcement of fishing and non-fishing concerns including eco-tourism.

c. Set a system for small-scale fishworker rights.

d. Recognize, record and apply traditional knowledge concerning marine resources and ecosystems and incorporate it into modern management systems in collaboration with those concerned.

e. Strengthen environmentally sound artisanal and subsistence fishing technologies, collaborate with coastal communities for the elimination of unsound ones, and adapt local traditional fisheries to multi-species management.

f. Reinforce training and extension services in coordination with rural agriculture services together with appropriate financing mechanisms.

g. Develop or reinforce fisheries and aquaculture extension and management activities among women.

h. Recognize the special status of indigenous peoples including their rights to utilization and protection of their habitats on a sustainable basis.

94. Coastal States should ensure that, in their negotiation and implementation of international agreements on the development or conservation of living marine resources, local communities and indigenous peoples are represented and their interests, in particular, their right to subsistence, are secured.

95. For important coastal ecosystems such as coral reefs, countries with the assistance of international and regional organizations should:

a. Survey the present state of coral reef resources to determine risks to development and conservation.

b. Establish systematic observation systems to follow future trends as a basis for management measures.

c. Provide information for regional and global assessments of the state of coral reefs.

d. Undertake research on major changes observed in coral reef ecosystems and their possible relationships to human impacts and global change.

e. Plan for the multiple use of coral reef resources where compatible with the preservation of their productivity and biodiversity.

f. Take steps to eliminate damaging impacts on coral reefs and to restore damaged reefs to a productive state.

Data and Information:

96. States with the cooperation of international and regional organisations should:

a. Make available data and information adequate for fisheries assessment, including verifiable catch and effort statistics.

b. Develop and share analytical and predictive tools such as stock assessment and bioeconomic models to assist in risk management and decision-making in data-limited situations involving uncertainty and irreversibility.

c. Acquire all the data, current and historic, necessary for effective management of fisheries resources including data on catch and effort, by-catch and the impact of fishing on other users and the marine environment.

97. Coastal states together with regional and international organizations should:

a. Complete/update marine biodiversity, living resource and critical habitat inventories of coastal areas and EEZ's, at national and regional levels.

b. Improve data collection systems, and, provide the appropriate data to regional and international fisheries bodies and organizations.

c. Develop information systems incorporating the ecosystem management approach at the national and regional level.

International and Regional Cooperation and Coordination:

98. Relevant United Nations and other international agencies should coordinate their efforts to increase their assistance to coastal developing countries and regional organizations in implementing the above activities, and in particular:

a. Provide for the transfer of environmentally sound technologies to develop their fisheries, and to replace harmful fishing practices.

b. Establish a methodology to assess the nutritional and health impacts of fishery policies and projects.

c. Promote the study, scientific assessment and use of traditional management systems.

d. Develop necessary international controls, and transfer management methods and environmentally sound fishing technology for rare and fragile resources in trade, including ornamental tropical fish, shells and corals.

e. Identify new additional funds for implementation.

99. Relevant United Nations and other international agencies should prepare guidelines on:

a. Sustainable fishing in order to reduce waste, protect endangered species, reduce pollution and improve fishing gear efficiency and selectivity.

b. Applications of a precautionary approach to living resources management.

c. The concepts of the Marine Catchment Basin for enclosed seas, the ecosystem management approach and "large marine ecosystems", including their practical implications and applications.

d. Environmentally sound intensive aquaculture.

100. The international community and the private sector should develop/improve markets to promote direct human consumption of fish and to enhance the contribution of subsistence fisheries.

101. Financial organizations should provide support for the development of small-scale fisheries, mariculture and deep-sea fishing by developing countries.

Means of Implementation

Financing and Costing:

102. The total cost to restructure the fisheries sector is estimated at up to $6 billion per year, excluding investments needed to organize sector reconversion to reduce overcapitalization. The catalytic funding proposed to implement the above activities at the national and regional levels is on the order of $60 million annually to accelerate development and improve management, including $4 million to strengthen regional and international organizations.[15]

Scientific and Technological Means:

103. Special attention should be given to mechanisms for transferring resource information and improved fishing technologies to the fisherfolk and other users at the local level.

104. Countries should implement the FAO/ICES Code of Practice for Consideration of Transfer and Introduction of Marine and Freshwater Organisms and regional bodies should transfer available safe technologies in cooperation with national centres.

Human Resource Development:

105. Regional bodies should encourage multidisciplinary training and research on marine living resources, particularly in social and economic sciences as well as in the use of geographical information systems.

106. International and regional organisations should assist countries to create training opportunities to support artisanal including subsistence fisheries, to develop small-scale use of living marine resources at national and regional levels and to encourage equitable participation of women and indigenous peoples.

Capacity Building:

107. Each coastal country, with the assistance of relevant regional and international agencies, should:

a. Complete their legal and policy frameworks in line with UNCLOS.

b. Establish a coordinated institutional framework and intersectoral mechanisms for living marine resources management through regular consultation between the decision makers and the users.

c. Develop procedures to involve the coastal communities, the academic and private sectors in the development and implementation of programmes.

d. Develop or upgrade scientific and technical infrastructure for systematic observations, control and surveillance required for decision-making and strategic assessments of development potential.

108. States and international agencies should strengthen existing regional fisheries management bodies and should create new ones where necessary.

109. States, international, regional and non-governmental organizations should provide support to traditional coastal communities, indigenous peoples, women and subsistence fisherfolk, including the technical and financial assistance to organize, maintain, exchange and improve traditional technological knowledge of marine resources.

E. ADDRESSING CRITICAL UNCERTAINTIES FOR THE MANAGEMENT OF MARINE ENVIRONMENT AND CLIMATE CHANGE

Basis for Action

110. Rational use and development of coastal areas and marine resources requires the ability to determine their present state of systems and to predict future conditions. The high degree of uncertainty in present

information prevents effective management and limits the ability to make predictions and assess environmental change. Systematic data on ocean environmental parameters will be needed to apply integrated management approaches and to predict effects of global climate change on fisheries. In order to determine the role of the oceans in driving global systems and to predict natural and man-induced changes in marine and coastal ecosystems, the mechanisms to collect, synthesize and disseminate ocean information from research and monitoring activities need to be restructured and reinforced considerably.

111. There are many uncertainties about climate change and particularly sea level rise. Small increases in sea level have the potential of causing significant damage to small islands and low-lying coasts. Response strategies should be based on sound data. A long-term co-operative research commitment based on differentiated responsibilities of countries is needed to provide data required for global climate models and to reduce uncertainty. Meanwhile, precautionary measures should be initiated to diminish the risks and effects, particularly on small islands, low-lying States and coastal zones of the world.

Objectives

112. By 1995, begin coordinated national and regional observation programmes for coastal and near-shore phenomena related to climate change and for resource parameters essential for ocean and coastal management in all regions.

Activities

Management-related:

113. States, acting individually and through appropriate regional and international mechanisms, should:

a. Conduct scientific research on, systematic observation and monitoring of the marine environment, within and beyond the limits of national jurisdiction.

b. Exchange data and information resulting from scientific research and monitoring, and from traditional ecological knowledge.

c. Develop standard inter-calibrated procedures, measuring techniques, and data storage capabilities for scientific research on and systematic observation of the marine environment.

d. Provide improved forecasts of marine conditions for safety of inhabitants of coastal areas and efficiency of maritime operations.

e. Communicate the information generated by research and systematic observations to all levels of the management structure and the public.[16]

114. Coastal states should adopt special measures to cope with potential climate change and sea level rise, including the development of globally accepted methodologies for coastal vulnerability assessment, modelling and response strategies particularly for priority areas, such as small islands, low-lying states and critical coastal areas.[17]

115. Coastal countries with the cooperation of relevant United Nations organizations should identify on-going and planned programmes of systematic observation of the marine environment, with a view to integrating activities and establishing priorities to address critical uncertainties for ocean and coastal area management.[18]

Data and Information:

116. The Global Ocean Observing System (GOOS) of the IOC is being designed in cooperation with WMO, UNEP and other agencies, to provide basic information on the world ocean required to analyze, assess and predict global climate and environmental changes, and to provide data for Geographic Information System and other information systems, but more elements will be needed for an effective system. Specifically, States should:

a. Support development of the interdisciplinary systematic global and regional observation networks of coastal, nearshore and open ocean areas as proposed in GOOS (A/CONF.151/PC/70).

b. Create regional accessible and readily-transferred multi- sectorial information bases, covering the results of research and systematic observation programmes.

c. Link these databases to existing data and information services and mechanisms such as the World Weather Watch and Earthwatch for communicating these results to decision makers, environmental managers and the general public.

d. Promote the exchange of data and information, and its storage and archiving through the World Data Centres.

International and Regional Cooperation and Coordination:

117. Since a coordinated global effort is fundamental to address critical uncertainties for the management of the marine environment and climate change, nations in cooperation with international organizations should:

a. Offer technical cooperation in developing the capacity of coastal States for marine research and monitoring, and for using its results.

b. Establish joint international ocean analysis and prediction centres in order to prepare and disseminate global and regional oceanographic analyses and forecasts and to provide facilities for international research and training.

118. Relevant United Nations agencies should strengthen high-level inter-agency coordination and review mechanisms[19] to develop and integrate systematic observation networks. This would include:

a. Review of existing national, regional and global data bases.

b. Mechanisms to develop comparable and compatible techniques, validate methodologies and measurements, organize regular scientific reviews, agree on formats for presentation and storage, and communicate the information gathered to potential users.

c. Systematic observation and monitoring of coastal habitats and sea level changes, inventories of marine pollution sources and reviews of fisheries statistics.

d. Organization of periodic assessments of ocean and coastal states and trends.

119. UNEP should support countries to develop and integrate regional systematic long-term observation programmes into the Regional Seas Programmes in a coordinated fashion to implement global and regional ocean and coastal observing systems based on the principle of exchange of data. One aim should be predicting the effects of climate-related emergencies on existing coastal physical and socio-economic infrastructure. Site-specific analysis of sea level rise effects and temperature elevations on sensitive coastal ecosystems and lagoons and economically important species will also be necessary.

Means of Implementation

Financing and Cost Evaluation:

120. For data and information activities in the EEZs of developing countries, GOOS is presently estimated to require about 700 million of which about 370 million would come annually from the international community matching about 230 million by the countries themselves. Funding mechanisms are needed for this and for related marine technology and engineering. International organization costs should be increased by $4 million for the full implementation of GOOS. Other large-scale scientific programmes are being planned but their costings are not presently available.[20]

Scientific and Technological Means:

121. To address critical uncertainties through systematic coastal and ocean observations and research, coastal States should develop and adopt, through existing cooperation with the relevant United Nations organizations, the common scientific and technological methods, standards, quality assurance procedures, norms for data exchange, and research approaches required. They should cooperate on a regional basis, through existing programmes where possible, share infrastructure and expensive and sophisticated equipment, and develop human resources jointly.

Human Resource Development:

122. Countries, with assistance from donors and international organizations, should develop a broad and coherent approach to meeting their core human resource needs in the marine sciences.[21]

Capacity building:

123. Countries should strengthen or establish National Oceanographic Commissions or equivalent bodies to liaise with national users, work closely with international organizations, and develop and support marine science activities.

124. Countries should use existing regional mechanisms to develop knowledge of their shared marine environment, exchange information, organize systematic observations and assessments, and make most effective use of scientists, facilities and equipment.

F. STRENGTHENING INTERNATIONAL, INCLUDING REGIONAL COOPERATION AND COORDINATION

Basis for Action

125. In order to implement the above strategies and activities through efficient and cost-effective actions and to ensure the integration of environment and development aspects, existing institutional arrangements at national, regional and global level need adjustment and strengthening. There are numerous global and regional institutions with competence in marine issues, with a fragmented largely-sectoral distribution of responsibilities reflecting the situation at the national level. There is a need to improve coordination among institutions concerned with oceans and coastal areas at the international level, to strengthen the links between international institutions and Governments, including through regular and effective intergovernmental discussion, and to ensure that all levels operate in an integrated and multi-sectoral way, particularly relating environment and development.

126. Intergovernmental and inter-secretariat cooperation and coordination is also required at the regional level, where a number of bodies already exist both within and outside the United Nations system.

127. The United Nations Convention on the Law of the Sea (UNCLOS) provides a global framework and lays down basic rights and duties relating to ocean environment and development activities. Acceptance of these rights and duties and of other relevant international agreements forms an important basis for international coordination and cooperation.

Objectives

128. Ensure, at the regional and global level, consistency among and integration of the various sectoral activities addressing environment and development in oceans and coastal areas, including those covered in the other programme areas on oceans in Agenda 21.

129. Create, within the United Nations system, an opportunity for regular intergovernmental review and consideration of environment and development with respect to oceans and coastal areas as a whole, and of the agreed principles, strategy and standards.

130. Establish effective information exchange and, where appropriate, institutional linkages between regional institutions dealing with environment and development in oceans and coastal areas.

131. Ensure the effective operation of coordinating mechanisms for the components of the United Nations system dealing with environment and development in oceans and coastal areas, and links with other concerned organizations including donor and assistance agencies.

Activities

Management-Related:

GLOBAL

132. The United Nations General Assembly should ensure regular consideration within the United Nations system at intergovernmental level of general ocean and coastal issues, including environment and development matters, and request the Secretary-General and Executive Heads of United Nations agencies and organizations to strengthen consultative and coordinating mechanisms for this purpose, including the following:

a. Introduce special arrangements to ensure the participation of all relevant international organizations, including the development and donor agencies.

b. Seek scientific advice and consider the use of advisory expert groups, as needed.

c. Establish reporting arrangements between the General Assembly and the governing bodies of the United Nations system.

d. Strengthen coordination and develop improved relationships among the relevant international organizations with major ocean responsibilities (UNEP, UNESCO, IOC, WMO, IMO, FAO, IAEA, United Nations OALOS, etc.), including their regional components and strengthen coordination with other United Nations organisations, institutions and specialized agencies dealing with development, trade and other related economic issues, as appropriate.

e. Improve representation of agencies dealing with the marine environment in United Nations-wide coordination efforts.

f. Better coordinate international and regional coastal and marine programmes.

g. Provide for adequate agency input into the Global Environmental Facility and similar funding mechanisms that may be established.

133. Settlement of disputes, such as on trade and environment, should be dealt with in appropriate bilateral, regional and international forums, e.g. GATT, in accordance with established international rules and dispute settlement agreements as well as with multilateral standards to be agreed upon, giving due consideration to concerns for sustainable development. Pending enactment of such standards, States should refrain from taking unilateral non-tariff measures to protect a given marine resource.

134. Governments participating in various international forums often send representatives of different national sectors. In ocean-related fields, where all issues are closely interrelated it is essential that each government integrate sectoral interests.

REGIONAL

135. States and regional organizations, with the cooperation of international organizations, should:

a. Strengthen existing intergovernmental regional cooperation, particularly the Regional Seas Programmes of UNEP, and use regional intergovernmental forums to harmonize policies and integrate cooperative activities.

b. Introduce arrangements for the regional collaboration and coordination of all relevant organizations and bodies, development assistance and donor agencies, and the private sector.

c. Arrange for periodic interregional consultations in support of those conducted at the global level.

d. Develop regional centres or networks for expertise and assistance such as the Regional Centres for Marine Technology now being established in some areas.

Data and Information:

136. To ensure an adequate flow of information from the international and regional levels to catalyze action, international and regional organizations and donor countries should:

a. Assist States, on request, to implement the principles in the Law of the Sea Convention and other relevant instruments, including using marine scientific research as a management tool.

b. Develop a central reference point for information on legislation and for advice on implementation of legal agreements.

c. Strengthen the capacity of international organizations to handle information globally and to assist in developing national and regional data and information systems.

d. Further develop existing international information coordination and assessment mechanisms such as Earthwatch and GESAMP to review the adequacy of present data and information at the global level and to organize regular assessments of global ocean problems.

e. Prepare periodic overview reports of efforts to understand the oceans.

137. The ocean-related parts of the United Nations should, through system-wide consultations, prepare agendas and supporting documentation on major issues in the implementation of a coherent oceans programme.[22]

Means of Implementation

Financing and Cost Evaluation:

138. The proposed cost for strengthening regional cooperation is $12 million per year in additional support for international organizations and regional coordinating units, and at least $25 million annually in further direct support to activities at the regional level. Improving international coordination and strengthening the global role of the United Nations system to implement Agenda 21 in oceans and coastal areas would cost a proposed $12 million per year, which would approximately double present expenditures and would catalyze and coordinate much larger national expenditures.

Scientific and Technological Means:

139. International organizations and donor countries should encourage the development of international and regional centres of excellence in marine technology and in the analysis and assessment of scientific data on the oceans.

Human Resource Development:

140. International and regional organizations and donor countries should stimulate the development of new or expanded training centres in developing regions to produce the full range of human resources needed on a continuing basis to develop and manage marine resources sustainably.

141. The staffs of international and regional organizations should be strengthened and given broader experience in integrated approaches to ocean issues through interagency exchanges and short-term assignments. Agency staff should as a matter of policy participate directly in field activities in developing countries.

Capacity Building:

142. The capacity of the United Nations system to implement ocean and coastal activities is handicapped by the fragmentation of responsibilities among many agencies and programmes. The mechanisms for interagency policy development and programme coordination should at a minimum be reinforced through regular formal consultations. A more radical rationalization and restructuring of the United Nations system in this area should also be considered, as the cost savings and improvements in efficiency could be considerable and present

tendencies to duplication could be avoided. This is particularly true of the coastal area management activities of FAO, UNEP and UNESCO/IOC, the marine pollution activities of FAO, IAEA, IMO, UNEP, UNESCO/IOC and WHO, and the legal activities of FAO, IMO, OALOS and UNEP. Where mandates inevitably overlap because of the breadth of ocean issues, close cooperation and the development of joint programmes should be required.

143. The capacity of international organizations both within and outside the United Nations system to cooperate at the regional level should be strengthened. The multiplication of separate regional programmes should be avoided by strengthening or establishing regional coordinating units or programmes under the responsibility of the governments of the region (such as the Regional Seas Programmes) through which international organizations and donor countries can develop cooperative activities that respond to the development and environment priorities of the States in the region.

G. SUSTAINABLE DEVELOPMENT OF ISLANDS [23]

Basis for Action

144. Islands are a special case both for environment and development. They tend to be ecologically fragile and vulnerable with frequently a unique flora and fauna, giving them a proportionally very high share of global biodiversity. Their small size, limited resources and isolation disadvantage them economically and prevent economies of scale. They have all the problems and challenges of the coastal zone concentrated in a limited land area. The indigenous island peoples have rich and diverse cultures with special adaptations to the island environment and knowledge of the sound management of its resources. Because island development options are limited, there are special challenges to planning for sustainable development. Many islands must depend for their economic development on marine resources shared between waters under their national jurisdiction and the high seas. With the threats of global climate change and sea-level rise, many islands may also be at increasing risk, and certain island States could in the long term be threatened by the loss of their entire national territory.

Objectives

145. To adopt and implement sustainable development plans for islands, including meeting essential human needs within island limits, maintaining biodiversity, and increasing the quality of life for island peoples.

Activities

Management-Related:

146. Island States and Territories, with the assistance as appropriate of international and regional organizations, should:

a. Prepare medium and long-term plans for sustainable development integrating the multiple use of limited island resources and identifying types of development compatible with island limits.

b. Adapt coastal area management techniques to the special characteristics of islands.

c. Prepare or complete an inventory of island natural resources and species, and define measures to protect endangered species and to maintain biodiversity with the assistance of the international community.

d. Study the special environmental and developmental characteristics of islands and possible appropriate development strategies.

e. Develop techniques for determining the carrying capacity of islands under different development assumptions and resource constraints.

f. Explore new kinds of technology for development within island limits and identify chemicals and technologies which should be excluded because of their threats to essential island systems.

g. Study the vulnerability of islands to global change and sea-level rise and possible response options.

Data and Information:

147. Information on the geographic, environmental and socio-economic characteristics of islands should be compiled and assessed to assist in the planning process. Existing island databases should be expanded and geographic information systems adapted to islands developed.

International and Regional Cooperation and Coordination:

148. States, regional and international organizations should develop inter-island, regional and inter-regional cooperation and information exchange, including periodic regional and global meetings on sustainable development of islands.

Means of Implementation

Financing and Cost Evaluation:

149. Technical cooperation costs to implement these activities amount to $7 million per year. A programme on integrated planning for sustainable development of islands will cost about $130 million per year, to be financed by private and public sources. About $40 million could come from the international community. Since many small islands will never develop an adequate economic or population base to provide all of the services necessary for a reasonable quality of life, some external support will frequently be required on a continuing basis. In addition, the need to maintain the island share of global biodiversity will further limit development options and should be supported by the international community with at least $3 million per year.

Scientific and Technical Means:

150. Centres for the development and diffusion of technologies appropriate to islands should be established on a regional basis.

Human Resource Development:

151. Since small island populations cannot maintain all necessary specializations, training for island management and development should aim to produce generalists able to integrate the many factors which need to be considered in island governance. Resource users should be trained to carry out many management and protection functions for themselves. Educational systems should be modified to meet these needs and special training programmes developed in integrated island management and development.

Capacity Building:

152. The small scale of islands will always limit their total capacity. Existing capacity must therefore be restructured to meet the needs for sustainable development and integrated management efficiently within present human and financial means. New technologies may be used to increase the capacity of very small populations to meet their needs.

EXPLANATORY NOTES

1. The cost figures given are for the incremental additional cost to expected coastal development to make it environmentally sound and sustainable. Many of these developments would be endangered physically or economically by environmental deterioration without these additional investments. These amounts should come primarily from the national public and private sectors and could be at least partly covered by income from user fees. Sustainable tourism development, for example, could be financed partly from the proper pricing of natural resources, charges for pollution and tourist usage of environmental services. The activities on coastal area management and development are clearly linked to many other parts of Agenda 21 concerning human settlements, agriculture, freshwater and particularly chapters I.8 Integration of Environment and Development in Decision Making and II.2 Planning and Management of Land Resources.

2. New environmentally safe technologies and methodologies are needed for human settlements, coastal agriculture, intensive aquaculture, desalinization, coastal industries, tourism, etc., and opportunities offered by coastal marine technology such as tidal and ocean energy, open-sea aquaculture, etc. should be investigated.

3. Local and indigenous communities should be supported to participate, and to maintain and apply their traditional knowledge of the coastal environment and marine resources. Local resource users and village leaders should be trained in the direct use of remotely sensed images and GIS outputs for their own integrated management of their coastal and marine areas and resources.

4. The references in this section to land-based activities and sea-based activities refer to all human activities which are sources of damage to the marine environment, and not to activities as the term is used in Agenda 21.

5. The Intergovernmental Meeting of Experts on Reduction of the Degradation of the Marine Environment from Land-based Sources of Pollution and Activities in Coastal Areas which met in Nairobi, 9-13 December 1991, following the decision of the 16th UNEP Governing Council, has prepared elements of a strategy and a targeted and costed programme of action as well as a set of principles (A/CONF.151/PC/113) which should be considered together with this section. A costed and targeted programme of action should then be finalized and adopted at an intergovernmental meeting which should be organized by UNEP soon after UNCED. There should be agreement on an effective mechanism to review systematically the implementation of global and regional agreements and action plans, as well as institutional and financial mechanisms ensuring the global coordination of the implementation of the action plan. The summary strategy from the Nairobi meeting, if accepted by PrepCom IV, could be appended to this Agenda 21 section.

6. This issue may require further consideration at PrepCom IV by Working Group III.

7. In the absence of any global inventory of land-based activities damaging the marine environment, it is presently impossible to give accurate global estimates for the control of the major sources of pollution and other impacts. Only two regional costings are now available. The investment required to protect the Mediterranean Sea against land-based sources of pollution and activities in coastal areas is estimated at $25 to 100 billion, but spread over 20 years this is $5-20 per person per year for the 250 million coastal residents and tourists. Estimates for the Baltic are similar on a per capita basis. These costs should be set against the benefits from the 51 million foreign tourists who contributed on average 6.5 percent of the GDP of Mediterranean countries; in France alone, Mediterranean coastal tourism brought in revenue of $7 billion in 1988. In addition, Mediterranean fisheries production is worth some $450 million annually. Both the Mediterranean and the Baltic are nearly enclosed seas bordered by heavily populated and industrialized areas; on open coasts where certain wastes are rapidly eliminated or dispersed and populations are less dense, a different level of control might be justified and costs per capita could be expected to be lower. Making a crude projection from the above figures, the needed global annual expenditures could be of the order of $5-20 billion during 1993-2000. This could be considered an upper limit, as the estimates on which it is based are high because of the sensitive conditions of enclosed seas.

8. Land-based activities cover many parts of Agenda 21. See particularly chapters I.6 health, I.7 human settlements, II.10 freshwater resources, II.11 toxic chemicals, II.12 hazardous wastes, II.13 solid wastes and II.1 atmosphere.

9. Costs for controlling pollution from sea-based activities include $560 million for oily waste reception facilities and $27 million for garbage reception facilities in ports, for an annual rate of investment of $84 million over the period 1993-2000. Oil spill response materials for the 100 countries not yet so equipped would average about $3.5 million per country or $350 million total, giving $50 million per year. The additional costs for technical cooperation and capacity building amount to $38 million per year. These costing do not include the additional costs (approximately $20 million each) for constructing tankers to the new double hull standard, which will be absorbed by the tanker owners.

10. Such as the World Maritime University, Malmö, the International Maritime Law Institute, Malta and the International Maritime Academy, Trieste.

11. For sewage treatment, see also chapter II.10 Protection of the Quality and Supply of Freshwater Resources.

12. Cooperative research programmes are needed on subjects such as:

a. Species life cycles and migration, identifying critical areas and life stages.

b. Effects of utilization and of changes, including climate changes, on the resources.

c. Linkages between EEZs and high seas resources.

d. The concept of large marine ecosystems and its potential for practical application in existing ocean management regimes.

13. The catalytic funding of $12 million per year required to improve high seas fisheries management has been costed on the basis of the activities listed in the action programme. However the principal costs of the investment needed to put high seas fisheries on a more sustainable basis ($300 million per year) have only been estimated as a pro-rata share of 5% of the costs described in note 14 below, since this is the high seas share of global ocean fisheries.

14. See also chapter IV.9 Providing Data and Information for Sustainable Development.

15. The catalytic funding of $60 million per year required by developing countries has been estimated based on the activities listed in the action programme. These include the cost of primary technical assistance, policy and technical advice to governments, improved data systems, policy and technical guidelines, training, meetings, demonstration projects, and additional support to NGOs, the regional bodies and international agencies to back up this effort. These costings do not include principal costs such as capital costs, heavy investments (e.g. research vessels or patrol boats), pre-investment studies, long-term training, etc. which would be many times higher than the catalytic costs. While there is no sound basis for estimating these principal costs, they must be funded if the catalytic expenses are to be justified. The crude estimation of $6 billion per year provided was derived from a global macroeconomic approach to give an order of magnitude figure. Total principal expenses required to restructure world fisheries on a sustainable basis by reducing world fishing effort come to over $100 billion, not counting a third as much required to reduce overcapitalization in large fleets; if the reconversion is spread over 20 years it would require $6 billion per year, but would save three times that amount in reduced losses from overinvestment. Pre-financing of the reconversion, including the additional amount for fleet reduction, would be necessary since the industry is too weak financially to start the process.

16. Related activities are covered in chapter IV.9 Providing Data and Information for Sustainable Development.

17. The activities in this section are closely related and complementary to those on climate change in chapter II.1 Protecting the Atmosphere.

18. Some suggested research priorities are:

a. Living resources potential including species life cycles and migration to identify critical areas and life stages.

b. Optimal fishing regimes and acceptable levels of exploitation.

c. Sources, fates and effects of all forms of chemical pollution and toxic phytoplankton blooms in coastal ecosystems.

d. Human health related to consumption of fishery products from marine and coastal ecosystems.

e. Development of appropriate and new marine technologies to utilise under-exploited resources, and for aquaculture, food processing and pollution control.

f. Utilization of marine environmental accountancy as a management tool.

g. Response of critical or sensitive marine ecosystems to coastal sustainable development and rehabilitation strategies for degraded areas.

h. Marine ecosystem functioning and resilience under stress.

i. The role of ocean circulation and upwelling in heat, nutrient and pollutant transport and their effects.

j. Development of species information useful as indicators of significant changes in ocean systems, and improvement of correlations between biological and physical oceanographic data.

19. Such as those under the United Nations system-wide Earthwatch. See chapter IV.9 Providing data and information for sustainable development.

20. For data and information activities, GOOS is presently estimated to require over $600 million annually, largely in national expenditures, in full operation, not counting new satellite systems and development costs, compared to present annual costs for oceanic observations of $50 million. Of this amount, at least $360 million would be for open ocean observations largely by developed countries, and $240 million for EEZ observations shared by 100 coastal countries. Assuming that half of this relates to developing countries and that these costs are shared equally with the international community, about $60 million will be needed annually in international support to developing countries. Present international organization costs of $1 million should be increased to $5 million for the full implementation of GOOS. Major research proposals under other oceans headings will also address critical uncertainties concerning marine resources and their exploitation.

21. The following are suggestions for strengthening human resources in the marine sciences in developing countries:

a. Use an interdisciplinary approach to teaching and training in marine science and ocean observation.

b. Make technical training more accessible to developing countries through new educational techniques such as computer-aided learning, expert systems, distance teaching, and multi-media learning packages.

c. Establish, on a national or regional basis, continuing education and training for professionals and support staff.

d. Provide the necessary institutional and financial support to maintain a core of trained marine professionals and technical support staff to undertake research and systematic observations; provide the scientific basis for management decisions; make scientific inputs to assessments of climate change impacts and response strategies; and train students to continue high-quality indigenous capabilities.

e. Increase the availability of information on ocean issues to decision-makers, teachers, women, indigenous people, local communities and others.

22. United Nations system-wide agendas and supporting documentation should be prepared on:

a. General policies, planning and needs for coordinated effort, such as integrated coastal area management and national capacity building.

b. Review of impediments to implementation and enforcement of global and regional agreements, and of developments in international law such as liability regimes and dispute settlement.

c. Review of assistance to developing countries and of needed collaboration with development assistance and donor agencies, non-governmental organizations and the private sector.

23. PrepCom III, in its discussions of fragile ecosystems under land resources as well as the oceans discussion, expressed considerable interest in the problems of small islands. The Secretary-General therefore decided to add a programme area on islands within the oceans and coastal areas theme. It should logically follow programme area A on coastal area management and development.

NOTES ON TEXT ORIGINS

To facilitate cross-referencing earlier documents, the following notes to each paragraph in the text give the paragraph numbers in the compilation document from which the text was derived. The compilation document in turn shows which wordings came from PC/42/Add.6, from text proposed by delegations during PrepCom III, or from submissions by delegations up to 15 October 1991. Text condensed from the compilation document is indicated as "edited"; text to which new wordings have been added while retaining the basic idea is indicated as "revised". Minor editorial changes not affecting the sense of the text are not separately noted. New material prepared by the Secretariat on the basis of inputs from many sources is indicated either as additions or as new paragraphs.

1. Note by the Secretariat
2. Note by the Secretariat
3. Note by the Secretariat
4. 1,2,3 edited and revised

5.	4 edited and revised with additions
6.	4 edited and revised
7.	5 edited
8.	7,6 edited
9.	8 revised
10.	11 revised
11.	4 edited and revised
12.	12 edited with additions
12a.	12a revised
12b.	Appendix II(16) edited
12c.	12 edited with additions
12d.	12b edited
12e.	12c edited
12f.	27bis(e) edited
12g.	12c edited
12h.	12c edited and revised
12i.	12d edited
12j.	12e edited and revised with additions
12k.	12f edited and revised
13.	13, 13bis edited and revised
13a.	New
13b.	13 edited
13c.	13, 13a, 13bis a, 13bis b edited and revised with additions
13d.	13a edited
13e.	13c edited
13f.	13d edited and revised
13g.	Annex III (VIII) edited
14.	16 edited and revised
14a.	16b edited
14b.	16c edited and revised
14c.	16d edited and revised
14d.	Appendix II edited
14e.	16e edited with additions from Appendix II
14f.	New
15.	14a
15a.	14a edited
15b.	New and 14b edited
15c.	14c edited and revised
15d.	15 edited
15e.	15 edited and revised
16.	New
17.	New
18.	20b edited and revised
19.	New
20.	18, 19e revised with additions
21a.	17 revised with additions
21b.	17a revised with additions
21c.	17b edited and revised
21d.	New
21e.	17c edited
22.	19 edited and revised

22a.	19a edited
22b.	19b revised
22c.	19c edited
22d.	New
22e.	19d revised
23.	21 edited and revised
24.	22, 26 edited and revised
25.	23 edited and revised
26.	24, 25 edited and revised
27.	28 edited
28.	29 revised
28a.	29a
28b.	29b
28c.	30a edited
29a.	32b, 29 edited and revised
29b.	32c edited with additions
29c.	49a, 49b edited
29d.	43a, 43b revised
29e.	39a edited
29f.	39c edited
30.	33 edited with additions
30a.	33a
30b.	33b with additions
30c.	33c edited with additions
31.	New
32.	34 edited and revised with additions
33a.	35a edited and revised
33b.	35b edited and revised
33c.	35c edited and revised with additions from UNEP expert consultation
33d.	35d revised
33e.	35e edited and revised
33f.	35f revised
33g.	35g edited
34.	36
34a.	36a
34b.	36b revised with additions
34c.	New
34d.	36c edited and revised with additions from UNEP expert consultation
34e.	36d revised with additions from UNEP expert consultation
35a.	37a
35b.	37b edited
35c.	37d edited
35d.	New
36.	39 with additions
36a.	39, 39a, 39b edited and revised
36b.	39 edited
36c.	44 edited
36d.	39c edited and revised
36e.	39d revised
37.	41
37a.	41 edited and revised
37b.	41 edited
37c.	40 edited

37d.	New
38a.	39a, 42 edited
38b.	42a
38c.	42b
38d.	42b
38e.	42c edited and revised
39.	43a
40.	43b edited and revised
41.	44 edited and revised
42.	46 edited
43.	47, 48 edited and revised
43a.	New
43b.	New
43c.	48c with additions
43d.	49c edited and revised with additions
43e.	48a, 49c edited and revised with additions
43f.	48b
43g.	New
44.	52bis edited
45.	53 edited
46.	New
47.	New
48.	New
49.	55 with additions
50.	New
51.	New
52.	New
53.	54 revised
54.	56a edited and revised with additions from UNEP expert consultation
55.	Note by the Secretariat
56.	Note by the Secretariat on 87, 88 and Annex III
57.	Note by the Secretariat on 69, 92, 93 and Annex III
58.	Note by the Secretariat on 96b and Annex III
59.	Note by the Secretariat on 81 and Annex III
60.	Note by the Secretariat on 82
61.	59 edited and revised with additions
62.	62, 63, 64A, 67 edited and revised with additions
63.	70 edited and revised with additions
64.	66bis revised
65.	77 edited and revised with additions
66.	70, 70(a) edited
66a.	70b edited and revised with additions from Addendum 1
66b.	90, 91bis edited and revised
66c.	89 edited and revised
66d.	70d with additions from Annex III
66e.	72A, 72B edited and revised
67.	86
68.	96bis edited
69.	65 revised
69a.	65 revised
69b.	73 edited with additions
69c.	76 edited

70.	94 revised with additions
71.	95a edited
72.	96b, 96c edited
73.	95 edited with additions
74.	96 edited and revised (for remainder of 96 see note 11)
75.	96d edited
76.	New
77.	New
78.	New
79.	New
80.	New
81.	60 revised
82.	61 revised
83.	62, 63, 64 (alternative A) and 67 revised with additions
84.	68 revised with additions
85.	New
86.	100 revised
87.	104 revised
88.	New
89.	71 revised and 70e
90.	New
91.	102 revised
92.	New
92a.	97, 117 edited and revised
92b.	72A, 72B edited and revised
92c.	97 edited
92d.	105 edited
92e.	121, 119 edited and revised
92f.	120 revised
92g.	104 edited and revised
92h.	119 edited with additions
92i.	New
93a.	116 edited with additions
93b.	117 edited
93c.	117 revised
93d.	106 edited
93e.	98 revised with additions from Annex III
93f.	98 revised
93g.	New
93h.	58 revised
94.	99 with additions
95.	New
96a.	65 revised
96b.	73 with additions
96c.	76 edited
97a.	100 revised
97b.	101 revised
97c.	103 edited
98.	New
98a.	107 edited and revised
98b.	111 edited

98c. 112 edited with additions
98d. 125A edited and revised with additions
98e. 107 revised
99. 108 edited
99a. 107 revised
99b. 108 edited and revised
99c. 108 edited and revised
99d. 109 revised
100. 110 with additions
101. 119 edited and revised with additions
102. New
103. 125 revised
104. 118 edited
105. 114 edited
106. 115 edited and revised
107a. 107 edited
107b. 83a edited and revised
107c. 83b edited
107d. New
108. New
109. 112 edited and revised
110. 126 edited and revised
111. 127 with additions
112. New
113. 128 edited
113a. 128a
113b. 128b edited
113c. 128c edited
113d. 128d edited
113e. 126 edited and revised
114. 129 edited
115. 130 edited (for remainder of 130 see note 17)
116. 131 revised with additions
116a. 132a revised
116b. 132b revised
116c. 132b revised
116d. 132c edited
117. New
117a. 133b edited
117b. New
118. 134 edited
118a. 134 edited
118b. 134a edited
118c. 134b revised
118d. New
119. 135 edited and revised
120. New and 133a edited
121. New
122. New
123. New
124. New

125. 136 revised with additions
126. 137 edited
127. 138 edited
128. 141a edited
129. 141b edited
130. 141c edited
131. 141d edited
132. 142(i) edited
132a. 142(ii)
132b. 142(iii)
132c. 142 (iv)
132d. 134f with additions
132e. 134d edited
132f. 134e edited
132g. New
133. 139 edited
134. 140 edited
135. New
135a. 143(i) edited
135b. 143(ii) edited
135c. 143(iv) edited
135d. New
136. New
136a. 144(i) edited
136b. 144(ii) edited
136c. New
136d. New
136e. 144(iii) edited and revised
137. 144(iv) revised with additions (for remainder of 144(iv) see note 20)
138. New
139. New
140. New
141. New
142. New
143. New
144. New
145. New
146. New
146a. 19d revised with additions
146b-g. New
147. New
148. New
149. New
150. New
151. New
152. New
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Item 2 (c) of Plenary Session
Item 3 of provisional agenda of Working Group II

PREPARATIONS FOR THE UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT ON THE BASIS OF GENERAL ASSEMBLY RESOLUTION 44/228 AND TAKING INTO ACCOUNT OTHER RELEVANT GENERAL ASSEMBLY RESOLUTIONS:

PROTECTION OF THE QUALITY AND SUPPLY OF FRESHWATER RESOURCES: APPLICATION OF INTEGRATED APPROACHES TO THE DEVELOPMENT, MANAGEMENT AND USE OF WATER RESOURCES

(Section II, Chapter 10 of Agenda 21)

Report of the Secretary-General of the Conference

INTRODUCTION

1. This document has been prepared by the Secretary-General of the Conference in response to decision 3/22 taken on 4 September 1991 at the third Preparatory Committee. It is based on the guidance provided by the Preparatory Committee on the structure of Agenda 21, as contained in decision 3/2 taken on 4 September 1991 at the third session of the Preparatory Committee. All text taken from document A/CONF.151/PC/WG.II/L.17/Revised are to be found nested between double asterisks (**‹), identifying where in the document it came from. Explanatory Notes are appended.

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2. **(WG.II/L.17/Rev./Paras. 1 to 14)< Effectively integrated management of water resources is important to all socio-economic sectors relying on water. Rational allocation prevents conflict and enhances the social development of local communities as well as economic planning and productivity. Efficient demand management allows water-using sectors to make long-term savings on water costs and stimulates resource-conscious production technologies. Health conditions and environmental quality should also improve either resulting from integrated development planning or as a beneficial consequence of improved environmental or social conditions.

Linkages to other Environmental and Developmental Issues:

3. Water is a finite resource, essential for the sustenance of life on earth. Virtually all the environmental issues listed in the United Nations General Assembly resolution 44/228 are directly or indirectly linked to freshwater issues. With increases in economic activities and the consequent potential for stress on ecosystems and natural resource stocks, the study and recognition of linkages between freshwater issues and other sectoral and cross-sectoral issues is becoming increasingly important. Socio-economic pursuit/including urbanization, industrial production and agricultural activities/has reached a stage where freshwater issues have often become the limiting factor for sustainable development. Freshwaters/rivers, reservoirs, lakes and ground waters [, polar ice mass and glaciers]/are in contact with other ecosystems and are used in a variety of human activities, many of which would not be possible without a freshwater supply of adequate quality and quantity.

4. Poor land-use management, including deforestation, non-sustainable agriculture, mining and urbanization, could lead to a considerable increase in erosion problems and related soil loss in the river basins. The sedimentation in large reservoirs may have serious adverse effects downstream by reducing the quantity of natural nutrients available to agricultural land or to coastal waters. The loss of nutrients can lead to increased fertilizer use and decreases in coastal fishery yields. Acidification of surface and some ground waters due to atmospheric deposition of air pollutants can lead to depletion of freshwater living resources, contributing to the loss of biodiversity. Construction of dams for hydropower and irrigation, water channelization, over-abstraction from aquifers, use of water bodies as open sewers for discharge of both domestic and industrial wastes can lead to salinization of rivers, lakes, and soils, salt intrusions in coastal aquifers, and serious water pollution problems. Should global warming occur as a result of climate change it would affect low-lying island freshwater resources and may affect the world's freshwater resources through [the melting of ice mass in the Arctic and Antarctic regions and] changes in the hydrologic cycle, resulting in changes in precipitation, with possible decreases in many areas of the Northern Hemisphere, accompanying decreases in soil moisture and annual river runoff. Even in the absence of global warming, natural variation in precipitation may be expected as in the past, resulting in periodic drought which can impact water availability, with consequent negative implications for economy and development. Because of these concerns, an integrated approach to freshwater management seems vital along with, for example, an integrated approach to pollution control, the optimal use of water and a holistic approach to the conservation of ecosystems.

5. [The existence of transboundary waters and their use is of significant importance to the riparian states concerned. In these circumstances it may be necessary for the concerned states to negotiate appropriate multilateral or bilateral agreements as relevant to ensure that riparian rights and practices should take into account the mutual interests of the parties concerned.]

6. Water-related diseases are still a major health problem, especially in the developing countries. Diseases caused by microbiological pollution of water supplies or transmitted by water-associated vectors, and those related to inadequate sanitation and absence of clean water, are widespread. With water use per capita expected to increase significantly in developing countries with high economic or population growth rates, the volume of waste requiring treatment is expected to present a growing problem. Likewise, the application of water-intensive production techniques and other high water-use consumption patterns are of concern in certain countries, particularly industrial ones. To ignore the interactions and linkages between freshwater issues and other sectoral issues could result in severe social, economic or human health consequences. Therefore, the provision of water supply and sanitation in developing countries is not only a vital ingredient of economic and social development but also an important element of environmental protection.

GENERAL OBJECTIVES

7. Water is a necessity of all life. The overall objective is to maintain the hydrological, biological and chemical functions of ecosystems to adapt human activities to the limits of nature's carrying capacity and to control water-related disease vectors.

8. Freshwater resources are an essential component of the earth's hydrosphere and an indispensable part of all terrestrial ecosystems. The freshwater environment is characterized by its hydrological regime including floods and droughts which, in some regions, have become more extreme and dramatic in their consequences in recent years. Global climate changes could also have their impact on freshwater resources and their availability and, through sea level rise, threaten coastal aquifers and small island ecosystems.

9. Freshwaters are a finite resource, not only indispensable for the sustenance of life on earth but also of vital importance to all socio-economic sectors. Development is not possible without considerable exploitation of water sources in relation to other land use activities and the control of deforestation and desertification. Priority must be given to the sustenance of land/water ecosystems, with particular attention to wetlands and biodiversity, and the satisfaction of basic human needs for drinking water, health protection and food security. For any water utilization beyond this, freshwater resources have to be considered as an economic good with an opportunity cost in alternative uses.

10. The Mar del Plata Action Plan, which emerged from the United Nations Water Conference in 1977, remains generally valid as the common basis for national and international action programmes in the freshwater sector. The review of progress achieved in its implementation and resulting strategies for the 1990s are reflected in Economic and Social Council resolution E/1991/85.

Agenda 21 in this sector, as presented hereunder, is based on these strategies, on the results of the Global Consultation on Safe Water and Sanitation for the 1990s, held at New Delhi in September 1990 (General Assembly resolution 45/181) and on the recommendations which may emerge from the International Conference on Water and the Environment in Dublin, January 1992, and on the results of the Preparatory Committee.

11. The wide-spread scarcity of freshwater resources, the progressive encroachment of incompatible activities and the gradual destruction of freshwater resources and their aggravating pollution in many world regions demands truly integrated water resources planing and management. The multi-sectoral nature of water resources development in the context of socio-economic development must be recognized as well as the multi-interest utilization of water resources for agriculture, industry, urban development, hydropower, inland fisheries, transportation, recreation and other activities. Rational water utilization schemes for the development of surface and underground water supply sources and other potential sources have to be supported by concurrent water conservation and wastage minimization measures.

12. Integrated water resources management necessitates appropriate mechanisms at the global, regional, national and local levels for implementing, coordinating and funding the related strategies and action programmes. Management of water resources should, as far as possible, take place in a river basin context (catchment level). [The options proposed by the International Conference on Water and the Environment/Development Issues for the 21st Century, held in Dublin, January 1992, has provided an input to identifying suitable implementation mechanisms.]

13. Capacity building is a prerequisite to integrated water resources management. Technical solutions will not achieve programme objectives on their own without suitable attention given to the human factor. The Symposium on a Strategy for Water Resources Capacity Building, held in Delft, June 1991, recognized the importance of capacity building for integrated and sustainable development of water resources at all levels. Capacity building consists of four basic elements:

a. creating an enabling environment with appropriate policy and legal frameworks;

b. institutional strengthening and development, including local community participation;

c. human resources development, including the strengthening of managerial systems and water users interests;

d. awareness building and education at all levels of society, [including inter alia, the consideration of a United Nations World Water Day].

14. [Adequate new and additional financial resources are indispensable for the effective utilization and protection of freshwater resources. Pursuant with the recognition of water as an economic good, but with priority to the satisfaction of basic needs, internal revenues have to be generated through

cost recovery schemes, water tariffs, taxes, etc. for uses implying productive activities, reflecting marginal and opportunity costs. In addition, external support will be required for water resources development from multilateral or bilateral sources (External Support Agencies) and from the private sector.]

15. Innovative technologies, including the improvement of indigenous techniques, are much needed to fully utilize limited water resources and to safeguard them against pollution. Implementation of Agenda 21 in the water sectors must therefore be supported by broad-based research and development programmes allowing for new technological solutions to be developed and field-tested. Technology [transfer on preferential and concessional terms] and [cooperation and diffusion] on all aspects of integrated water resources management is to be built into each programme area.>**

16. In accordance with the general objectives, the following Programme Areas are proposed for the freshwater sector:

A. Integrated Water Resources Development and Management

B. Water Resources Assessment

C. Protection of Water Resources, Water Quality and Aquatic Ecosystems

D. Drinking Water Supply and Sanitation

E. Water and Sustainable Urban Development

F. Water for Sustainable Food Production and Rural Development

G. [Impacts of Climate Change on Water Resources]

PROGRAMME AREAS

A. INTEGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT

Basis for action

17. **(WG.II/L.17/Rev./Paras. 17 to 23)< The extent to which water resources development contributes to economic productivity and social well being is not usually appreciated although all social and economic activities rely heavily on the supply and quality of fresh water. As populations and economic activities grow, many countries are rapidly reaching conditions of water scarcity or face limits to economic development. Water demands are increasing rapidly, with 70-80% for irrigation, less than 20% for industry and a mere 6% for domestic consumption. The holistic management of water as a finite and vulnerable resource, and the integration of sectoral water plans and programmes within the framework of national economic and social policy is of paramount importance for action in the 1990s and beyond. The fragmentation of responsibilities for water resources development among sectoral agencies is proving, however, to be an even greater impediment to promoting integrated water management than had been anticipated. Effective implementation and coordination mechanisms are required not only at the national level but also at the inter-country and international levels.

Objectives

18. The overall objective is to satisfy the freshwater needs of countries for their economic and social development.

19. Integrated water resources management is based on water as an integral part of the ecosystem, a natural resource and an economic good, the quantity and quality of which determines its utilization. To this end, the availability and quality of water resources have to be protected, taking into account the functioning of aquatic ecosystems and the perennity of the resource in order to satisfy or reconcile water needs for human activities. In developing and using water resources, priority has to be given to the satisfaction of basic needs and the safeguarding of ecosystems. Beyond these requirements, however, water users should be charged its true marginal costs.

20. Integrated water resources management should be carried out at the catchment basin or sub-basin level, taking into account existing interlinkages between surface and ground waters. Four principal objectives should be pursued as follows:

a. to promote a dynamic, interactive, iterative and multi-sectoral approach to water resources management, including the identification and protection of potential sources of freshwater supply, which integrates technological, socio-economic, environmental and human health considerations

b. to plan the rational utilization, protection, conservation and management of water resources based on community needs and priorities and within the framework of national economic development policy

c. to design, implement and evaluate projects and programmes which are both economically efficient and socially appropriate within clearly defined strategies, based on a full public participatory approach, including the participation of women and indigenous peoples in water management policy-making and decision-making at the community level as well as at the national, regional and global levels

d. to identify and strengthen or develop, as required, in particular in developing countries, the appropriate institutional, legal and financial mechanisms to ensure that water policy and its implementation is a catalyst for sustainable social progress and economic growth.

21. The strengthening of national capacities to manage the resource and the role of government and local organizations in creating the enabling environment for efficient and equitable utilization of the resource are crucial. In the case of transboundary water resources there is an even greater need to formulate and harmonize water resources strategies and action programmes.

22. [Although difficult to measure success in this area, quantitative targets could realistically be set as follows:

By the year 2000:

a. all countries, in accordance with their capacities and resources available, will have designed and initiated costed and targeted national action programmes, and 75% of all countries will have appropriate institutional structures and legal instruments in place.

By the year 2025:

b. sub-sectoral targets of all freshwater programme areas will be reached.

It is understood that the fulfilment of the targets quantified in (a) and (b) above will depend upon new and additional financial resources that will be made available to developing countries in accordance with the relevant provisions of General Assembly resolution 44/228.]

Activities

23. [Countries, especially developing countries, according to their possibilities and with the assistance of relevant United Nations bodies and international donors, could implement the following activities to improve integrated water resources management in their countries:]

a. formulation of costed and targeted national action plans and investment programmes;

b. integration of measures for the protection and conservation of potential sources of freshwater supply, including the inventorization of water resources, with land-use planning, forest resource utilization and other relevant development activities;

c. development of interactive databases, forecasting methods and economic planning models;

d. optimisation of water resources allocation under physical and socio-economic constraints;

e. implementation of allocation decisions through demand management, pricing mechanisms and regulatory measures;

f. flood and drought management using risk analysis and environmental and social impact assessment;

g. promotion of schemes for rational water use through public awareness raising, educational programmes, levying of water tariffs and other economic instruments;

h. mobilization of water resources, particularly in arid and semi-arid areas;

i. promotion of international scientific research cooperation on freshwater resources;[1]

j. development of new and alternative sources of water supply such as seawater desalination, artificial groundwater recharge, use of marginal-quality water, wastewater reuse and water recycling;

k. integration of water quantity and quality management, including surface and underground water resources;

l. promotion of water conservation and wastage minimization schemes for all users, including the development of water-saving devices;

m. support to water users groups to optimize local water resources management;

n. development of public participatory techniques and their implementation in decision-making, particularly the enhancement of the role of women in water resources planning and management;

o. development and strengthening, as appropriate, of implementation mechanisms at all levels concerned:[2]

i. at the global level improved delineation of responsibilities, division of labour and coordination of international organizations and programmes;

[ii. at the regional level watershed-based organizations (river or lake basin authorities) and legal agreements for the joint management of transboundary water bodies;]

iii. at the national level integrated water resources planning and management in the framework of the national planning process, and where appropriate, establishment of independent regulation and monitoring of freshwater, based on national legislation and economic measures;

iv. at the [local/decentralized] level delegation of water resources management to the lowest appropriate level, including decentralization of government services to local authorities, private enterprises and communities

[p. elaboration, dissemination and application of operational guidelines in support of the implementation of national action plans and local water management schemes.]>**

Means of Implementation

Financing and Cost Evaluation:

24. During the period 1993 to 2000, an annual amount of about US$ 100 million of international financing is required to support national development in this programme area. The strengthening of international institutions in support of

the planning and initiation phases at the country level requires the allocation of about US$ 10 million per year. The transboundary and global freshwater issues require a financial support in the order of US$ 5 million annually for the executing of national, regional and global authorities and organizations. The total annual financing requirements in this programme area amount to US$ 115 million.[3]

Scientific and Technological Means:

25. The development of interactive databases, forecasting methods and economic planning models appropriate to the task of managing water resources in an efficient and sustainable manner will require the application of new techniques such as Geographic Information Systems and Expert Systems to gather, assimilate, analyze and display multi-sectoral information and also to optimize decision-making.[4] In addition, the development of new and alternative sources of water supply and low-cost water technologies will also require innovative applied research. This will involve the transfer of new techniques and technology to developing countries to be able to deal with the added dimension of integrating engineering, economic, environmental and social aspects of water resources management and the prediction of the effects of human impacts.[5]

26. Pursuant to the recognition of water as an economic good, the various available options for charging water users have to be further evaluated and field-tested, including domestic, urban, industrial and agricultural water user groups. Further development is required on economic instruments which take into account opportunity costs and environmental externalities. Field studies on the willingness to pay should be conducted in rural and urban situations.

Human Resources Development:

27. The delegation of water resources management to the lowest appropriate level necessitates the education and training of water management staff at all levels. Particular emphasis has to be placed on the introduction of public participatory techniques, including enhancement of the role of women. Skills related to various water management functions have to be developed also in the private sector, local/national NGOs, cooperatives, corporations and other water user groups.

Capacity Building:

28. Institutional capacity for water management should be developed when there is a clear demand. Existing administrative structures will often be quite capable of achieving local water resources management, but the need may arise for new institutions based upon e.g. river catchment areas, district development councils or local community committees. Although water is managed at various levels in the socio-political system, demand-driven management requires the development of water-related institutions at appropriate levels, taking into account the need for integration with land use management.

29. In creating the enabling environment for lowest appropriate level management, the role of government includes mobilization of financial and human resources, legislation, standard setting and other regulatory functions, monitoring and assessment of the use of water and land resources, and creating opportunities for public participation. International agencies and donors have an important role to play to support developing countries in creating the required enabling environment for integrated water resources management. This should include mechanisms to channel donor support to local levels in developing countries, including community-based institutions and NGOs.

B. WATER RESOURCES ASSESSMENT

Basis for action

30. **(WG.II/L.17/Rev./Paras. 25 to 28)< Water resources assessment (WRA), including the identification of potential sources of freshwater supply, is the continuing determination of sources, extent, dependability, and quality of water resources. It is the practical basis for their sustainable management and a prerequisite for evaluation of the possibilities for this development. There is, however, growing concern that at a time when more precise and reliable information is needed about water resources, hydrological services and related bodies are less able to provide this information, especially information on ground water and water quality. Major impediments are: the lack of financial resources for WRA, the fragmented nature of hydrological services and the insufficient numbers of qualified staff. At the same time the advancing technology for data capture and management is increasingly difficult to access for developing countries. Establishment of national data bases is, however, vital to WRA and for mitigating the effects of floods, droughts, desertification and pollution.

Objectives

31. Based upon the Mar del Plata Action Plan, this programme area is extended into the 1990s and beyond with the overall objective to ensure the assessment and forecasting of the quantity and quality of water resources, in order to estimate the total quantity of water resources available and their future supply potential, to reflect their current quality status, to predict possible conflicts between supply and demand and to provide a scientific data base for rational water resource utilization.

32. Five specific objectives are set accordingly as follows:

a. to make available to all countries water resource assessment technology which is appropriate to their needs, irrespective of their level of development, including methods for the impact assessment of climate change on freshwaters;

b. to have all countries, according to their financial means, allocate to water resource assessment financial resources in line with the economic and social needs for water resources data;

c. to ensure that the assessment information is fully utilized in the development of water management policies;

d. to have all countries establish the institutional arrangements needed to ensure the efficient collection, processing, storage, retrieval and dissemination to users of information about the quality and quantity of available water resources in an integrated manner;

e. to have sufficient numbers of appropriately qualified and capable staff recruited and retained by water resource assessment agencies, and provided with the training and retraining they need to carry out their responsibilities successfully.

33. [Quantitative programme targets can be set for the number of countries covered with adequate services:

a. by the year 2000 all countries, appropriate to their individual capacities and available resources, should have studied in detail the feasibility of installing water resources assessment services;

b. by the year 2000 there should be water resources assessment services with a high-density hydrometric network installed in 70 countries, and services with limited but adequate capacity in 60 countries;

c. by the year 2025 there should be 110 countries with fully developed services, and 40 countries with services of a limited capacity;

d. the longer-term target is to have fully operational services, based upon high-density hydrometric networks, available in all countries, appropriate to their individual capacities and available resources.]>**

Activities

34. [Countries, especially developing countries, according to their possibilities and with the assistance of relevant United Nations agencies, regional and international organizations and donor agencies, and through bilateral and multilateral agreement, should undertake the following activities]:

a. institutional framework

i. establish and strengthen the institutional capabilities of countries, including the legislative and regulatory arrangements, that are required to ensure the adequate assessment of their water resources and the provision of flood forecasting services;

ii. establish and maintain effective cooperation at the national level between the various agencies responsible for the collection, storage and analysis of hydrological data;

iii. establish and maintain effective cooperation between countries that is necessary for the assessment of the water resources of shared river basins and aquifers, and of the geographical regions extending over more than one country.

b. data systems[6]

i. review existing data collection networks and assess their adequacy, including those that provide real time data for flood forecasting;

ii. improve networks to meet accepted guidelines for the provision of data on water quantity and quality for surface and groundwater;

iii. apply standards and other means to ensure data compatibility;

iv. upgrade facilities and procedures used to store, process and analyze hydrological data and make such data and the forecasts derived from them available to potential users;

v. establish data bases, catalogues, year books and other means of informing users as to the availability of all types of hydrological data at national, regional and international levels;

vi. implement "data rescue" operations, e.g. establishment of national archives of water resources;

vii. implement appropriate well-tried techniques for the processing of hydrological data;

viii. derive area-related estimates from point hydrological data;

ix. assimilate remotely sensed data and the use, where appropriate, of geographical information systems.

c. data dissemination[7]

i. identify the need for water resources data for various planning purposes;

ii. analyze and present data and information on water resources in the forms required for planning and management of countries' socio-economic development, for use in environmental protection strategies and in the design and operation of specific water-related projects;

iii. provide forecasts and warnings of flood to the general public and civil defense.

d. research and development[8]

i. establish or strengthen research and development programmes at national, regional and international levels in support of water resource assessment activities;

ii. monitoring of research and development activities to ensure that they make full use of local expertise and other local resources and that they are appropriate for the needs of the country or countries concerned.

Means of Implementation

Financing and Cost Evaluation:

35. In order to attain the programme area targets as stated above by the year 2000, total average annual funding in the order of US$ 350 million is required, including contributions from external sources of US$ 140 million annually. The strengthening of international institutions for the development and exchange of information and technology requires about US$ 5 million per year. The total international financing needs for the years 1993 to 2000 for this programme area amount to US$ 145 million annually.[9]

Scientific and Technological Means:

36. The three most important research needs include: development of Global Hydrologic Models in support of analysis of climate change impact and of macroscale water resources assessment; closing the gap between terrestrial hydrology and ecology at different scales including the critical water-related processes behind loss of vegetation, land degradation and its restoration; study of the key processes in water quality genesis, closing the gap between hydrological flows and biogeochemical processes. The research models should build upon hydrological balance studies and also include the consumptive use of water.[10]

37. Water resource assessment necessitates the strengthening of existing systems for technology transfer and the development of new technology for use under field conditions. Prior to the above activities it is necessary to prepare catalogues of the water resources information held by government services, private sector, educational institutes, consultants, local water use organizations and others.

Human Resources Development:

38. Water resource assessment requires the establishment and maintenance of a body of well-trained and motivated staff sufficient to undertake the above activities. Education and training schemes have to be maintained at the national and/or regional levels designed to ensure an adequate supply of these trained personnel. In addition, the provision of attractive terms of employment and career paths for professional and technical staff should be encouraged. Human resources needs should be monitored periodically, including all levels of employment. Plans have to be established to meet these needs through education and training opportunities, and international programmes of courses and conferences.[11]

Capacity Building:

39. The conduct of water resource assessment on the basis of operational national hydrometric networks requires an enabling environment at all levels. National support action is necessary for enhanced national capacities:

a. review the legislative and regulatory basis of water resource assessment;

b. facilitate close collaboration between water sector agencies, particularly between information producers and users;

c. implement water management policies based upon realistic appraisals of water resource conditions and trends;

d. strengthen the managerial capabilities of water users groups to improve water use efficiency at the local level.

C. PROTECTION OF WATER RESOURCES, WATER QUALITY AND AQUATIC ECOSYSTEMS

Basis for action

40. **(WG.II/L.17/Rev./Paras. 31 to 35(h))< There are few regions of the world that are still exempt from problems of loss of potential sources of freshwater supply and of degraded water quality and the pollution of surface and groundwater sources. Major problems affecting the water quality of rivers and lakes arise from inadequately treated domestic sewage, inadequate controls on the discharges of industrial waste waters, the loss and destruction of catchment areas, siting of industrial plants, deforestation, uncontrolled shifting cultivation and poor agricultural practices, giving rise to the leaching of nutrients and pesticides. Aquatic ecosystems are disturbed and the living freshwater resources are threatened. Aquatic ecosystems are also affected by agricultural water resource development projects such as dams, river diversions, water installations and irrigation schemes. Erosion, sedimentation, deforestation and desertification have led to increased land degradation, and the creation of reservoirs has, in some cases, resulted in adverse effects on the food chain. Many of these problems have arisen from a development model which is environmentally destructive and from a lack of public awareness and education about surface and groundwater resource protection. Ecological and human health effects are the measurable consequences, although the means to monitor them are grossly inadequate or non-existent in many developing countries.

Objectives

41. Already the Mar del Plata Action Plan recognized the intrinsic linkage between water resource development projects and their important repercussions of a physical, chemical, biological, health and socio-economic nature. The overall environmental health objective was set:

"to evaluate the consequences which the various users of water have on the environment, to support measures aimed at controlling water-related diseases, and to protect ecosystems".

42. Three objectives will have to be pursued concurrently to integrate water quality aspects into water resource management:

a. maintenance of ecosystem integrity/a management principle to preserve aquatic ecosystems, including the living resources, and to protect them effectively from any form of degradation;

b. public health protection/a task requiring not only the provision of pathogen-free drinking water but also the control of disease vectors in the aquatic environment;

c. human resources development/a key to capacity building and a prerequisite for implementing water quality management.

43. [The following targets have been set to integrate water quality aspects into water resource management:

a. by the year 2000 all countries, appropriate to their capacities and resources available, should have identified all potential sources of water supply and prepared outlines for their protection, conservation and rational use;

b. by the year 2000 all countries should have effective water pollution control programmes, defined as enforceable standards for major point-source discharges and high-risk non-point sources, commensurate with their socio-economic development;

c. by the year 2000 all countries should participate, as far as appropriate, in inter-country and international water quality monitoring and management programs such as the Global Water Quality Monitoring Programme GEMS/WATER, UNEP's Environmentally Sound Management of Inland Waters, FAO's regional inland fishery bodies, and the RAMSAR Convention on Wetlands of International Importance especially as Waterfowl Habitat;

d. by the year 2025 the prevalence of water-associated diseases should be drastically reduced, starting with the eradication of dracunculosis (Guinea worm) by the year 2000 and onchocerciasis (river blindness) by the year 2000;[12]

e. by the year 2025 all countries should have established biological, health, physical and chemical quality criteria for all water bodies (surface and ground water) with a view to an ongoing improvement of water quality.]

Activities

44. [All countries, especially developing countries, according to their possibilities and with the assistance of appropriate United Nations agencies and other international organizations, regional economic cooperation organizations, and in cooperation with the industrialised countries could embark upon the following activities:]

a. Water resources protection and conservation

i. establishment and strengthening of technical and institutional capacities to identify and protect potential sources of water supply

ii. promotion and extension of the application of GIS and EIA

iii. identification of potential sources of water supply and preparation of national inventories

iv. preparation of national plans for water resources protection and conservation

v. strengthening of administrative and legislative measures to prevent encroachment into potentially usable catchment areas.

b. water pollution prevention and control

i. application of the polluter pays principle to all kinds of sources, including on-site and off-site sanitation

ii. promotion of the construction of treatment facilities for domestic sewage, drainage waters, industrial effluents, and the development of appropriate and indigenous technologies

iii. establishment of standards for the discharge of effluents and for the receiving waters

iv. introduction of the precautionary approach in water quality management

v. mandatory environmental impact assessment on all water resource development projects potentially impairing water quality and aquatic ecosystems, combined with a strengthened control of new industrial installations, solid waste landfills and infrastructure development projects

vi. enforcement of decisions based on risk assessment and risk management

vii. identification and application of best environmental practices to avoid diffuse pollution, i.e. through a limited, rational and planned use of nitrogenous fertilizers and other agrochemicals (pesticides, herbicides) in agricultural practices

viii. encouragement and promotion of adequately treated and purified wastewaters in agriculture, aquaculture, industry and other sectors.

c. development and application of clean technology

i. control of industrial waste discharges, including low-waste production technologies and water recirculation

ii. treatment of municipal wastewater for safe reuse in agriculture and aquaculture

iii. development of biotechnology for waste treatment, production of biofertilizers, etc.

iv. development of appropriate and indigenous methods for water pollution control.

d. groundwater protection

i. application of the necessary measures to mitigate saline intrusion into aquifers of small islands and coastal plains as a consequence of sea-level rise or of over-exploitation of coastal aquifers

ii. prevention of aquifer pollution through the establishment of protection zones in groundwater recharge and abstraction areas

iii. design and management of landfills based upon sound hydrogeological information and impact assessment, using best available technology

iv. mandatory water quality monitoring, on a permanent basis, of surface and groundwaters potentially affected by landfills.

e. protection of aquatic ecosystems

i. rehabilitation of polluted and degraded water bodies to restore aquatic habitats and ecosystems

ii. rehabilitation programmes for agricultural lands and for other users, taking into account equivalent action for the preservation and use of groundwater resources, important for agricultural productivity and for the biodiversity of the tropics

iii. conservation, in a balanced ecological and socio-economic framework, and protection of wetlands due to their ecological and habitat importance for many species as well as their socio-economic values

iv. control of noxious aquatic species which may destroy some other water species.

f. protection of freshwater living resources

i. control and monitoring of water quality to allow for the sustainable development of inland fisheries

ii. protection of ecosystems from pollution for the development of freshwater aquaculture projects.

g. monitoring and continuous surveillance of water resources and waters receiving wastes

i. establishment of networks for the monitoring and continuous surveillance of waters receiving wastes and of point and diffuse sources of pollution

ii. surveillance of all pollution sources to improve the compliance with standards and regulations and to regulate the issue of discharge permits

iii. monitoring of the utilization of chemicals in agriculture

iv. rational land use to prevent land degradation, erosion and siltation of lakes and other water bodies.

h. development of national and international legal instruments for water quality protection

The protection of the quality of water resources requires legal instruments, particularly for:

i. monitoring and control of pollution in national and transboundary waters

ii. control of long-range atmospheric transport of pollutants

iii. control of accidental and/or deliberate spills in national and/or transboundary water bodies

iv. environmental impact assessment.>**

Means of Implementation

Financing and Cost Evaluation:

45. Funds for pollution control have to be generated ultimately within each river basin and/or country through cost recovery and economic or fiscal instruments. The "polluter pays principle" (PPP) has to be adopted in conformity with the notion of water as an economic good. Total costs, including those financed nationally, are estimated at about US$ 1.0 billion annually for the period 1993 to 2000. Of this amount about US$ 330 million would be needed annually from international sources.[13]

46. The assessment of global environmental issues also includes water quality and aquatic ecosystems monitoring and assessment. River monitoring for global flux estimates is covered under programme area B already, and the necessary funds indicated there. About US$ 10 million annually would be needed in addition to this to strengthen international institutions. The total financing requirement for this programme area amounts to US$ 340 million annually.[14]

Scientific and Technological Means:

47. Countries should undertake cooperative research projects to develop solutions to technical problems which are appropriate for the conditions in each watershed or country. To this end research centres have to be developed and linked through networks, supported by regional water research institutes. The north-south twinning of research centres and field studies by international water research institutions should be actively promoted. It is important that a minimum percentage of funds for water resource development projects is allocated to research and development, particularly in externally funded projects.[15]

48. Monitoring and assessment of complex aquatic systems often require multi-disciplinary studies involving several institutions and scientists in a joint programme. International water quality programmes, such as GEMS/WATER, should be oriented towards the water quality of developing countries. User-friendly software, GIS and GRID methods should be developed for the handling, analysis and interpretation of monitoring data and for the preparation of management strategies.[16]

Human Resources Development:

49. Innovative approaches must be adopted for professional and managerial staff training in order to cope with changing needs and challenges. Flexibility and adaptability to emerging water pollution issues must be developed. Training activities should be undertaken periodically at all levels within the organizations responsible for water quality management, and innovative teaching techniques adopted for specific aspects of water quality monitoring and control, including development of training skills, inservice training, problem-solving workshops and refresher training courses.

50. Suitable approaches include the establishment of regional technical and engineering courses on water quality protection and control subjects at existing inter-country schools, and education/training courses for laboratory and field technicians, women and other water user groups for water resources protection and conservation.[17]

Capacity Building:

51. The effective protection of water resources and ecosystems from pollution requires considerable upgrading of most countries' present capacities. Water quality management programmes require a certain minimum infrastructure and staff to implement technical solutions and to enforce regulatory action. One of the key problems today and for the future is the sustained operation and

maintenance of these facilities. In order not to allow resources gained from previous investments to deteriorate further, immediate action is required in a number of areas.[18]

D. DRINKING WATER SUPPLY AND SANITATION

Basis for action

52. **(WG.II/L.17/Rev./Paras. 37 to 40)< Safe water supplies and environmental sanitation are vital for protecting the environment, improving health and alleviating poverty. An estimated 80% of all diseases and over one third of deaths in developing countries are caused through the consumption of contaminated water and on average as much as one tenth of each person's productive time is sacrificed to water-related diseases. Concerted efforts during the 1980s brought water and sanitation services to hundreds of millions of the world's poorest people. The most outstanding of these efforts is the launching in 1981 of the United Nations International Drinking Water Supply and Sanitation Decade (IDWSS) which resulted from the Mar del Plata Action Plan adopted by the United Nations Water Conference in 1977. The commonly agreed premise was that "all peoples, whatever their stage of development and their social and economic conditions, have the right to have access to drinking water in quantities and of a quality equal to their basic needs." The target of the IDWSS was to provide safe drinking water and sanitation to underserved urban and rural areas by 1990. But even the unprecedented progress achieved during this decade was not enough. One in three people in the developing world still lacks these two most basic requirements for health and dignity. It is also recognized that human excreta and sewage are the main causes of deterioration of water quality in developing countries, and the introduction of available technologies, including appropriate technologies, and the construction of sewage treatment facilities could bring significant improvement.

Objectives

53. The New Delhi Statement formalized the need to provide, on a sustainable basis, access to safe water in sufficient quantities and proper sanitation for all, requesting "some for all rather than more for some". Four Guiding Principles provide for the programme objectives:

a. protection of the environment and safeguarding of health through the integrated management of water resources and liquid and solid wastes;

b. institutional reforms promoting an integrated approach and including changes in procedures, attitudes and behaviour, and the full participation of women at all levels in sector institutions;

c. community management of services, backed by measures to strengthen local institutions in implementing and sustaining water and sanitation programmes;

d. sound financial practices, achieved through better management of existing assets, and widespread use of appropriate technologies.

54. Past experience has shown that specific targets should be set by each individual country. At the Summit for Children in September 1990, heads of state or government called for both universal access to water supply and sanitation and the eradication of guinea worm disease by 1995. Even for the more realistic target to achieve full coverage in water supply by 2025, it is estimated that annual investments must reach double current levels. One realistic strategy to meeting present and future needs, therefore, is to develop lower cost but adequate services that can be implemented and sustained at the community level.

Activities

55. [All countries, especially developing countries, according to their possibilities and with the assistance of appropriate United Nations agencies and other international organizations, and in cooperation with the industrialised countries could embark upon the following activities:]

a. the environment and health

i. establishment of protected areas for sources of water supply;

ii. sanitary disposal of excreta and sewage, using appropriate systems to treat wastewaters in urban and rural areas;

iii. expansion of urban and rural water supply;

iv. building and expansion, where appropriate, of sewage treatment facilities and drainage systems;

v. treatment and safe reuse of domestic and industrial wastewaters in urban and rural areas;

vi. control of water-associated diseases.

b. people and institutions

i. [strengthening the functioning of governments in water resources management and, at the same time, giving full recognition to the role of local authorities]

or:

ii. [encouraging decentralization and the part played by local authorities, private enterprises and NGOs]

or:

iii. [drawing attention of governments to the need for greater decentralization and for strengthening the role of local authorities, private enterprises and NGOs]

iv. human resources development at all levels, including special programmes for women;

v. broad-based education programmes, with particular emphasis on hygiene, local management and risk reduction;

vi. [international coordination mechanisms for programme funding and implementation].

c. national and community management

i. support and assist communities in managing their own systems on a sustainable basis;

ii. encouragement of [the local population, especially] women in water management;

iii. linkages between national water plans and community management of local waters;

iv. integration of community management of water in the context of overall planning;

v. promotion of primary health and environmental care at the local level, including training for local communities in appropriate water management techniques and primary health care;

vi. assisting service agencies to be more cost-effective and responsive to consumer needs;

vii. more attention to be given to underserved rural and low-income peri-urban areas;

viii. rehabilitation of defective systems, reduction of wastage and safe reuse of water and wastewater [through additional international financing];

ix. [programmes for operation and maintenance on the basis of cost recovery and charging mechanisms]

or:

x. [programmes for rational water use and ensured maintenance];

xi. research and development of appropriate technical solutions;

xii. [review of the criteria of financial assessment of drinking water and sanitation projects of multi-lateral credit organizations by taking into account mainly the environmental and social benefits of these projects];

xiii. [international efforts of solidarity by the developed countries with the developing countries in granting new and additional financial resources in accordance with resolution 44/228 in order to install treatment plants for urban waste waters].>**

d. awareness creation and public information/participation

i. strengthening of sector monitoring and information management at sub-national and national levels;

ii. annual processing, analysis and publishing of monitoring results at national and local levels as a sector management and advocacy/awareness creation tool;

iii. use of limited sector indicators at regional and global levels to promote the sector and raise funds;

iv. improve sector coordination, planning and implementation, with assistance of improved monitoring and information management, to increase the sector's absorptive capacity, particularly in community based self-help projects.

Means of Implementation

Financing and Cost Evaluation:

56. Accelerated development is necessary to reach the desired coverage of water supply and basic sanitation services by the year 2000. The rate of investment for the years until 2000 has, at least, to be doubled to a total of US$ 20 billion annually to achieve complete service coverage. The external component should be maintained at no less than one third of this, i.e. at about US$ 6.7 billion annually. The improved operation, maintenance and management of systems and the full utilization of the investments made requires the allocation of external support in the order of US$ 0.7 billion. The total external funding needs until the year 2000 are, therefore, US$ 7.4 billion annually.[19]

Scientific and Technological Means:

57. To ensure the feasibility, acceptability and sustainability of planned water supply services, adopted technologies must be responsive to the needs and constraints imposed by the conditions of the community concerned. Thus, design criteria involve technical, health, social, economic, provincial, institutional and environmental aspects which determine the characteristics, magnitude and cost of the planned system. Relevant international support programmes should address the developing countries concerning:

a. pursuit of low-cost scientific and technological means as far as practicable;

b. utilization of indigenous approaches as far as practicable, to maximise and sustain local involvement;

c. assistance to country-level technical/scientific institutes to facilitate curricula development to support fields critical to the water and sanitation sector.[20]

Human Resources Development:

58. To effectively plan and manage water supply and sanitation at the national, provincial, district and community level, and to most effectively utilize funds, trained professional and technical staff must be developed within each country in sufficient numbers. To do this countries must establish manpower development plans taking into consideration present requirements and planned developments. Subsequently, the development and performance of country-level training institutions should be enhanced so that they can play a pivotal role in capacity building. It is also important that countries provide adequate training for women in the sustainable maintenance of equipment, water resource management and environmental sanitation.

Capacity Building:

59. The implementation of water supply and sanitation programmes is a national responsibility. To varying degrees responsibility for the implementation of projects and the operating of systems should be delegated to all administrative levels right down to the community and individual served. This also means that national authorities together with the agencies and bodies of the United Nations system and other external support agencies in providing support to national programmes have to develop mechanisms and procedures to collaborate at all levels.[21] This is particularly important if full advantage is to be taken of community based approaches and self-reliance as tools to sustainability. This entails a high degree of community participation, involving women, in the conception, planning, decision-making, implementation and evaluation of projects for domestic water supply and sanitation.

60. Overall national capacity building at all administrative levels including institutional development, coordination, human resources, community participation, health and hygiene education, literacy, etc. have to be developed as fundamental to any efforts to improve health and socio-economic development through water supply and sanitation and their impact on the human environment. Capacity building should therefore be one of the underlying keys in implementation strategies. Institutional capacity building should be considered as equally important as sector supplies and equipment, so that funds can be directed to both aspects. This can be undertaken at the planning or programme/project formulation stage with clear definition of objectives and targets in this regard. In this respect technical cooperation among developing countries (TCDC) is crucial, due to available wealth of information and experience, and to avoid re-inventing the wheel. This has proven cost-effective in many country projects already.

E. WATER AND SUSTAINABLE URBAN DEVELOPMENT

Basis for action

61. **(WG.II/L.17/Rev./Paras. 42 to 45)< Early in the next century, more than half of the world's population will be living in urban areas. By 2025 that proportion will have risen to 60%, some 5 billion people.[22] Rapid urban population growth and industrialization are putting severe strains on the water resources and environmental protection capabilities of many cities.

Scarcity of freshwater resources and the escalating costs of developing new resources have a considerable impact on national industrial, agricultural and human settlement development and economic growth. Better management of urban water resources, including the elimination of unsustainable consumption patterns, can make a substantial contribution to the alleviation of poverty and improvement of the health and quality of life of the urban and rural poor. This situation is particularly serious in developing countries. A high proportion of large urban agglomerations are located around estuaries and in coastal zones, leading to pollution from municipal and industrial discharges combined with over-exploitation of available water resources and threatening the marine environment and the supply of freshwater resources.

Objectives

62. The development objective of this programme is to support local and central governments' efforts and capacities to sustain national development and productivity through environmentally sound management of water resources for urban use. Supporting this objective is the identification and implementation of strategies and actions to ensure the continued supply of affordable water for present and future needs, and to reverse current trends of resource degradation and depletion.

63. [Countries should strive to achieve by the year 2000:

a. All urban residents would have access to at least 40 litres per capita and day of safe water and 75% are provided with on-site or community facilities for sanitation.

b. All countries would establish and apply quantitative and qualitative discharge standards for municipal and industrial effluents.

c. 75% of solid waste generated in urban areas would be collected and recycled or disposed of in an environmentally safe way.][23]

Activities

64. [All countries, especially developing countries, according to their possibilities and through regional and international cooperation, and with the support of NGOs and the private sector, could undertake the following activities:]

a. protection of water resources from depletion, pollution and degradation

i. introduction of sanitary waste disposal facilities based on ecologically sound low-cost and upgradable technologies;

ii. implementation of urban storm water runoff and drainage programmes;

iii. promotion of recycling and reuse of waste-water and solid wastes;

iv. control of industrial pollution sources to protect water resources;

v. protection of watersheds from depletion and degradation of their forest cover and from harmful upstream activities;

vi. promotion of research into the contribution of forests to sustainable water resources development;

vii. limitation of the intensive use of agrochemicals with a view to minimizing their impact on water resources.

b. efficient and equitable allocation of water resources

i. reconciliation of city development planning with the availability and sustainability of water resources;

ii. satisfaction of the basic water needs of the urban population;

iii. introduction of water tariffs, where affordable, which reflect the marginal and opportunity cost of water, especially for productive activities.

c. institutional/legal/management reforms

i. adoption of a city-wide approach to the management of water resources;

ii. promotion at the national and local level of the elaboration of land use plans which give due consideration to water resources development;

iii. utilization of the skills and potential of non-governmental organizations and the private sector and local people, taking into account the public and strategic interests in water resources.

d. promotion of public participation

i. initiation of public awareness campaigns to encourage the public towards rational water utilization;

ii. sensitization of the public for the protection of water quality within the urban environment;

iii. promotion of public participation for the collection, recycling and elimination of wastes.

e. support to local capacity building

i. development of legislation and policies to promote investments in urban water and waste management reflecting the major contribution of cities to national economic development;

ii. provision of seed money and technical support to the local handling of materials supply and services;

iii. encouragement, to the extent possible, of autonomy and financial viability of city water, solid waste and sewerage utilities;

iv. creation and maintenance of a cadre of professionals and semi-professionals for water, wastewater and solid waste management.>**

f. provision of enhanced access to sanitary services

i. implement water, sanitation and waste management programmes focused on the urban poor;

ii. make low-cost water supply and sanitation technology choices available;

iii. base choice of technology and service levels on user preferences and willingness to pay;

iv. mobilize and facilitate the active involvement of women in water management teams;

v. encourage and equip local water association and water committees to manage community water supply systems and communal latrines, with technical backup available when required;

vi. rehabilitate existing malfunctioning systems and correct operation and maintenance inadequacies, before investing in new systems.

Means of Implementation

Financing and Cost Evaluation:

65. Total costs incurring for the installation of sewage collection and treatment facilities amounts to about US$ 9 billion annually, including about US$ 1.8 billion in external financing. The needs for urban drainage programmes are also about US$ 9 billion annually, including about US$ 2.3 billion in international funding. Operation and maintenance and related capacity building measures require about US$ 1.8 billion annually, including about US$ 0.4 billion in international financial support. The total external financing requirements amount to about US$ 4.5 billion annually.[24]

Scientific and Technological Means:

66. The 1980s saw considerable progress in the development and application of low-cost water supply and sanitation technologies. The programme envisages continuation of this work, with particular emphasis on development of appropriate sanitation and waste disposal technologies for low-income

high-density urban settlements. There should also be international information exchange, to ensure a widespread recognition among sector professionals of the availability and benefits of appropriate low-cost technologies. The public awareness campaigns will also include components to overcome user resistance to "second class" services, emphasizing the benefits of reliability and sustainability.

Human Resources Development:

67. Implicit in virtually all the elements of this programme is the need for progressive enhancement of the training and career development of personnel at all levels in sector institutions. Specific programme activities will involve the training and retention of staff with skills in community involvement, low-cost technology, financial management, and integrated planning of urban water resources management. Special provision is made for mobilizing and facilitating the active participation of women in water management teams, and for supporting the development of water associations and water committees, with appropriate training of treasurers, secretaries, caretakers, etc. Special education and training programmes for women should be launched with regard to the protection of water resources and water quality within urban areas.

Capacity Building:

68. In combination with human resources development, strengthening of institutional, legislative and management structures are key elements of the programme. A prerequisite for progress in enhancing access to water and sanitation services is the establishment of an institutional framework which ensures that the real needs and potential contributions of presently unserved populations are reflected in urban development planning. The multi-sectoral approach which is a vital part of urban water resources management requires institutional linkages at national and city levels, and the programme includes proposals for establishing inter-sectoral planning groups. Proposals for greater pollution control and prevention depend for their success on the right combination of economic and regulatory mechanisms, backed by adequate monitoring and surveillance.

69. Establishment of appropriate design standards, water quality objectives and discharge consents is therefore among the proposed activities. The programme also includes support for strengthening the capability of water and sewerage agencies, and for developing their autonomy and financial viability. Operation and maintenance of existing water and sanitation facilities has been recognized as a serious shortcoming in many countries. Technical and financial support is needed to help countries to correct present inadequacies and build up the capacity to operate and maintain rehabilitated and new systems.

F. WATER FOR SUSTAINABLE FOOD PRODUCTION AND RURAL DEVELOPMENT

Basis for action

70. **(WG.II/L.17/Rev., para. 47)< Sustainability of food production increasingly depends on sound and efficient water use and conservation practices consisting primarily of irrigation development and management

including water management in rainfed areas, livestock water supply, inland fisheries and agro-forestry. Rural development requires the integrated satisfaction of basic human needs for drinking water and for food production. While significant expansion of the area under rainfed agriculture has been achieved during the past decade, the productivity response and sustainability of irrigation systems have been constrained by problems of water-logging and salinization. Financial and market constraints are also a common problem. Soil erosion in the upstream watersheds, mismanagement and over-exploitation of the natural resources [in downstream watersheds] and acute competition for water, have all influenced the extent of poverty, hunger and famine in the developing nations. Soil erosion caused by overgrazing of livestock in uplands is also often responsible for the siltation of lakes. The development of irrigation schemes is most often not supported by environmental impact assessments identifying hydrological consequences within watersheds and due to interbasin transfers, nor by the assessment of social impacts on peoples in river valleys.>**

71. The non-availability of water supplies of suitable quality is a significant limiting factor to livestock production in many countries and improper disposal of animal wastes can in certain circumstances result in pollution of water supplies for both humans and animals. The drinking water requirements of livestock vary according to species and environment in which they are kept. It is estimated that the current global livestock drinking water requirement is around 60 billion litres a day and based on livestock population growth estimates, this daily requirement is predicted to increase by 0.4 billion litres per annum in the foreseeable future.

72. Freshwater fisheries in lakes and streams are an important source of food and protein. Fisheries of inland waters should be managed to maximize the yield of aquatic food organisms in an environmentally sound manner. This requires the conservation of water quality and quantity as well as the functional morphology of the aquatic environment. On the other hand, fishing and aquaculture themselves may damage the aquatic ecosystem and hence their development can only be perused subject to guidelines for impact limitation. Present levels of production from inland fisheries, both from fresh and brackish water, are around 7 million tons per year and could increase to 16 million tons per year by the year 2000; however, any increase in environmental stress could jeopardize this rise.

Objectives

73. **(WG.II/L.17/Rev./Paras. 48 and 49)< An International Action Programme on Water and Sustainable Agricultural Development (IAP-WASAD) has been initiated by FAO in cooperation with other international organizations. The main objective of the IAP-WASAD is to assist developing countries in planning, developing and managing water resources on an integrated basis to meet the present and future needs for agricultural production, taking into account environmental considerations.

74. The IAP-WASAD has developed a framework for sustainable water use in the agricultural sector and identified priority areas for action at national, regional and global levels. Quantitative targets for new irrigation development, improvement of existing irrigation schemes and reclamation of

waterlogged and salinized lands through drainage for 130 developing countries are estimated on the basis of food requirements, agro-climatic zones and availability of water and land.>**

75. The targets for irrigation, drainage and small-scale water programmes by the year 2000 for 130 developing countries are: (a) 15.2 million hectares of new irrigation development; (b) 12 million hectares of improvement/modernization of existing schemes; (c) 7 million hectares installed with drainage and water control facilities and (d) 10 million hectares of small-scale water programmes and conservation.

76. **(WG.II/L.17/Rev., para. 52)< The development of new irrigation areas at the above level may give rise to environmental concerns as this may imply the destruction of wetlands, water pollution, increased sedimentation and a reduction in biodiversity. Therefore, new irrigation schemes should be accompanied by an environmental impact assessment in case considerable negative environmental impacts are expected and also depending upon the scale of the scheme. Before developing new irrigation schemes, efforts should be made towards a more rational exploitation of existing schemes, including increased efficiency and productivity. Technologies for new irrigation schemes should be thoroughly evaluated, including their potential conflicts with other land uses. The active involvement of water users groups is a supporting objective.>**

77. The objectives with regard to water management for inland fisheries and aquaculture include conservation of water quality and quantity requirements for optimum production and prevention of water pollution by aquacultural activities. The action programme seeks to assist member countries in managing the fisheries of inland waters through the promotion of sustainable management of capture fisheries as well as the development of environmentally sound approaches to intensification of aquaculture.

78. The objectives with regard to water management for livestock supply are twofold: provision of adequate amounts and safeguarding of drinking-water quality in accordance with the specific needs of different animal species. This entails maximum salinity tolerance levels and the absence of pathogenic organisms. No global targets can be set due to large regional and intra-country variations.

Activities

79. **(WG.II/L.17/Rev., para. 54 (a) to (e))< [Countries, especially developing countries, according to their possibilities and with the support of the international community and cooperation of the private sector and NGOs, could undertake the following activities to protect their water resources from depletion and degradation:]

a. water use efficiency

i. increase of efficiency and productivity in agricultural water use for better utilization of limited water resources;

ii. strengthening of water and soil management research under irrigation and rainfed conditions;

iii. monitoring and evaluation of irrigation project performance to ensure, inter alia, the optimal utilization and proper maintenance of the project;

iv. support to water users groups with the aim to improve management performance at the local level;

v. supporting the appropriate use of relatively brackish water for irrigation.

b. waterlogging, salinity control and drainage

i. introduction of surface drainage in rainfed agriculture to prevent temporary waterlogging and flooding of lowlands;

ii. introduction of artificial drainage in irrigated and rainfed agriculture;

iii. encouragement of conjunctive use of surface and groundwaters, including monitoring and water balance studies;

iv. practising of drainage in irrigated areas of arid and semi-arid regions.

c. water quality management

i. establishment and operation of cost-effective water quality monitoring systems for agricultural water uses;

ii. prevention of adverse effects of agricultural activities on water quality for other social and economic activities and on wetlands, inter alia, through optimal use of on-farm inputs and the minimization of the use of external inputs in agricultural activities;

iii. establishment of biological, physical and chemical water quality criteria for agricultural water users and for marine and riverine ecosystems;

iv. prevention of soil run-off and sedimentation;

v. proper disposal of sewage from human settlements and of manure produced by intensive livestock breeding;

vi. minimize adverse effects from agricultural chemicals by use of integrated pest management;

vii. education of communities about the pollution impacts of the use of fertilizers and chemicals on water quality and food safety.

d. small-scale water programmes

i. development of small-scale irrigation, water supply for humans and livestock and for water and soil conservation;

ii. promotion of local initiatives for the integrated development and management of water resources;

iii. provision of adequate technical advice and support and enhancement of institutional collaboration at the local community level;

iv. [promotion of a technical farming approach for water management which takes account of the level of education, the capacity to mobilize local communities, and the ecosystem requirements of arid and semi-arid regions].

e. scarce water resources management

i. development of long-term strategies and practical implementation programmes for agricultural water use under scarcity conditions with competing demands for water;

ii. recognition of water as an economic and strategic good in irrigation planning and management;

iii. formulation of specialized programmes focused on drought preparedness with emphasis on food scarcity and environmental safeguards;

iv. promotion and enhancement of wastewater reuse in agriculture;

v. [encouragement of basin-wide cooperation in the integrated development of all types of transboundary water resources, taking into consideration the sovereignty of states and the equitable use of water resources].>**

f. water supply for livestock

i. improve quality of water available to livestock, taking into account their tolerance limits;

ii. increase the quantity of water sources available to livestock, and in particular those in extensive grazing systems in order to both reduce the distance needed to travel for water and to prevent overgrazing around water sources;

iii. prevent contamination of water sources with animal excrement in order to prevent the spread of diseases and in particular zoonosis;

iv. encourage multiple use of water supplies through promotion of integrated agro-livestock-fishery systems;

v. encourage water spreading schemes to increase water retention of extensive grasslands to stimulate forage production and prevent runoff.

g. inland fisheries

i. develop sustainable fishery management strategies within the framework of national and international water resources planning and monitor the implementation of such strategies;

ii. study specific aspects of the hydro-biology and environmental requirements of key inland fish species in relation to varying water regimes;

iii. prevent, mitigate or rehabilitate aquatic environments subjected to modification by other users for the sustainable use and conservation of biological diversity of living aquatic resources;

iv. develop and disseminate environmentally sound water resources development and management methodologies for the intensification of fish yield from inland waters;

v. establish and maintain adequate systems for the collection and interpretation of data on water quality, quantity and channel morphology related to management and the state of living aquatic resources including fisheries.

h. aquaculture development

i. develop environmentally sound aquaculture technologies that are compatible with local, regional and national water resources management plans and taking into consideration social factors;

ii. introduce appropriate aquaculture techniques and related water development and management practices in countries not yet experienced in aquaculture;

iii. assess environmental impacts of aquaculture with specific reference to commercialized culture units and potential water pollution from processing centres;

iv. evaluate economic feasibility of aquaculture in relation to alternative use of water, taking into consideration the use of marginal quality water and investment and operational requirements.

Means of Implementation

Financing and Cost Evaluation:

80. During the period 1983 to 2000, total annual costs for investments and technical support in this programme area are estimated in the order of about US$ 13.2 billion, of which about US$ 4.5 billion would have to come from international sources. This includes also about US$ 10 million annually to strengthen international, global and regional organizations.[25]

Scientific and Technological Means:

81. There is an urgent need for countries to monitor water resources and water quality, water and land use and crop production; compile inventories of type and extent of agricultural water development and their present and future contributions to sustainable agricultural development; evaluate the potential for fisheries and aquaculture development; and improve the availability and dissemination of data to planners, technicians, farmers and fishermen. Priority requirements for research are as follows:

a. identify critical areas for water-related adaptive research;

b. strengthen the adaptive research capacities of institutions in developing countries;

c. enhance translation of water-related farming and fishing systems research results into practical and accessible technologies and provide the support needed for their quick adoption at the field level.

82. Transfer of technology, both horizontal and vertical, needs to be strengthened. Mechanisms to provide credit, input supplies, markets, appropriate pricing and transportation must be developed jointly by countries and external support agencies. Integrated rural water supply infrastructure should be expanded for multiple uses and assist in developing the rural economy including facilities for water-related education and training and support services for agriculture.

Human Resources Development:

83. Training and human resources development should be actively pursued at the national level through: assessment of current and long-term human resources management and training needs; establishment of a national policy for human resources development; and initiation and implementation of training programmes for staff at all levels as well as for farmers. The necessary actions are as follows:

a. assess training needs for agricultural water management;

b. increase formal and informal training activities;

c. develop practical training courses for improving the ability of extension services to disseminate technologies and strengthen farmers' capabilities with special reference to small-scale producers;

d. train staff at all levels, including farmers, fishermen and members of local communities with particular reference to women;

e. increase the opportunities for career development to enhance the capabilities of administrators and officers at all levels involved in land and water management programmes.

Capacity Building:

84. The importance of a functional and coherent institutional framework at the national level to promote water and sustainable agricultural development has been generally fully recognized at present. In addition, an adequate legal framework of rules and regulations should be in place to facilitate actions on agricultural water use, drainage, water quality management, small-scale water programmes and the functioning of water users' and fishermen's associations. Legislation specific to the needs of the agricultural water sector should be consistent with, and stem from, general legislation for the management of water resources. Actions should be pursued in the following areas:

a. improve agricultural-, fisheries- and rural development-related water use policies and legal frameworks for implementing such policies;

b. review, strengthen and restructure, if required, existing institutions in order to enhance their capacities in water-related activities;

c. organizational structure, functional relationships and linkages among ministries and departments within a ministry;

d. specific measures that require support for institutional strengthening including long-term programme budgeting, staff training, incentives, mobility, equipment and coordination mechanisms;

e. enhance involvement of the private sector, where appropriate, in human resources development and provision of infrastructure;

f. transfer existing and new water use technologies by creating mechanisms for cooperation and information exchange among national and regional institutions.

G. IMPACTS OF CLIMATE CHANGE ON WATER RESOURCES

Basis for action

85. There is uncertainty in prediction of climate change at the global level; the uncertainties increase greatly at regional, national and local levels and yet it is at the national level that the most important decisions will need to be made. Higher temperatures or decreased precipitation will lead to decreased water supplies and increased water demands, and it may cause deterioration of the quality of freshwater bodies, putting strains on the already fragile balance between supply and demand in many countries. Even where precipitation might increase, there is no guarantee that it will occur at the time of year when it can be used and in addition there is a likelihood of increased flooding. Any rise in sea level will cause the intrusion of salt water in estuaries and coastal aquifers and on the flooding of low-lying coastal areas; this puts low-lying countries at great risk.

86. The Ministerial Declaration of the Second World Climate Conference (SWCC) states that "the potential impact of such climate change could pose an environmental threat of an up to now unknown magnitude; and could even threaten survival in some small island states and in low-lying coastal, arid and semi-arid areas." The conference saw that among the most important impacts of climate change will be its effects on the hydrological cycle and water management systems and, through these, on socio-economic systems. Increase in incidence of extremes, such as floods and droughts, would cause increased frequency and severity of disasters. The conference therefore called for a strengthening of the necessary research and monitoring programmes and the exchange of relevant data and information, these action to be undertaken at national, regional and international levels.

Objectives

87. The very nature of this topic calls first and foremost for more information about and greater understanding of the threat that is being faced. This may be translated into the following two objectives:

a. to understand and quantify the threat of the impact of climate change on freshwater resources by the year 2000;

b. to facilitate the implementation of effective national counter-measures, as and when the threatening impact is seen as sufficiently confirmed to justify such action.

Activities

88. Affected countries, especially developing countries, according to their possibilities and with the assistance of the international community, should develop programmes with the following purposes:

a. monitor the hydrological regime, including water quality, and related climate factors, especially in those regions and countries most likely to suffer from the adverse effects of climate change, where the localities vulnerable to these effects should be defined;

b. develop and apply techniques and methodologies for assessing the potential adverse effects of climate change, through changes in temperature, precipitation and sea-level rise on freshwater resources and the flood risk;

c. assess the resulting social, economic and environmental impacts;

d. develop and initiate response strategies to counter the adverse effects that are identified, including changing groundwater levels, and the mitigation of saline intrusion into aquifers;

e. contribute to the research activities underway within the framework of current international programmes.

Means of implementation

Financing and Cost Evaluation:

89. During the years 1993 to 2000, national programmes to assess and mitigate the effects of climate change will incur costs of about US$ 100 million annually, of which about US$ 40 million would have to come from international sources. Joint international research and case studies require additional US$ 4 million annually.[26]

Scientific and Technological Means:

90. Monitoring of climate change and its impact on freshwater bodies must be closely integrated with overall national and international programmes for monitoring the environment, in particular those concerned with the atmosphere, as discussed under other sections of Agenda 21, and with the hydrosphere as discussed under B above. The analysis of data for sign of climate change and as a basis for implementing measures to combat the threat is a specialized task that has yet to be refined to the level required. Extensive developmental work is necessary here and due account will be taken of the work of IPCC, IGBP and other relevant international programmes.

91. The development and implementation of response strategies requires innovative use of well-tried technological means and engineering solutions, including the installation of flood warning systems and the construction of new water-resource development projects such as dams, aqueducts, well fields, wastewater treatment plants, desalination works, levees, banks and drainage channels. There is also a need for coordinated research networks such as the IGBP/START network.

Human Resources Development:

92. The developmental work and innovation depend for their success on highly trained and motivated staff. International projects can help by enumerating alternatives, but each country needs to develop its own expertise in the scientific and engineering challenges to be faced, plus a body of dedicated individuals who are able to interpret the complex issues concerned for those required to make policy decisions. These specialized personnel need to be trained, hired and retained in service where they can serve their countries in these tasks.

Capacity Building:

93. There is a need, however, to build a capacity at the national level to develop, review and implement response strategies. Construction of major engineering works and installation of forecasting systems will require significant strengthening of the agencies responsible, whether in the public or the private sector. Most critical is the requirement for a socio-economic mechanism which can review predictions of the impact of climate change and possible response strategies and make the necessary judgements and decisions. These may necessitate the re-zoning of land and the re-allocation of financial resources, and could involve major legislation affecting taxes and individual and corporate rights as well as research programmes such as Human Response to Global Change.

EXPLANATORY NOTES

1. See also chapter IV.3 on Science for sustainable development.

2. See also chapter IV.6 on International institutional arrangements and chapter IV.8 on International legal instruments and mechanisms.

3. When estimating the financial requirements for integrated water resources management it has to be kept in mind that the bulk of investments and external donor support is covered under the programme areas D, E and F.

4. See also chapter IV.9 on Providing data and information for sustainable development.

5. See also chapter IV.2 on Transfer of environmentally sound technology.

6. See also chapter IV.9 on Providing data and information for sustainable development.

7. See also chapter IV.9 on Providing data and information for sustainable development.

8. See also chapter IV.3 on Science for sustainable development.

9. Financial support is required primarily for the establishment and strengthening of national hydrometric networks, also covering transboundary watercourses.

10. See also chapter IV.3 on Science for sustainable development.

11. See also chapter IV.4 on Promoting of education, training and public awareness.

12. Activities towards this target are included in chapter I.6 on Protection of human health conditions.

13. These costs are estimated for the establishment of legal, regulatory, institutional and technical measures to control water pollution.

14. Costs for erosion control, sewage treatment and infrastructure measures are contained in the relevant chapters of Agenda 21.

15. See also chapter IV.3 on Science for sustainable development.

16. Specific research and development subjects in this programme area should include:

a. development of low-cost biological monitoring techniques to obtain an integrated view of environmental pollution impacts;

b. study of distribution and pathways of inorganic and organic micro-pollutants, particularly agrochemicals, in aquatic ecosystems;

c. ecotoxicological studies of the long-term effects of particularly harmful chemicals on aquatic biota;

d. simplified mathematical models of water quality for management purposes;

e. field-testing of appropriate waste and pollution control technologies;

f. promoting the application of economic instruments and fiscal incentives for the control of water pollution sources;

g. establishing emergency control and response strategies, including contingency plans, for dealing with the treatment and clean-up of accidental spillages.

17. See also chapter III.1 on Women.

18. Specific capacity building activities are:

a. establishment and strengthening of institutional frameworks at national and local levels, including technical infrastructure for water quality monitoring, assessment and control, standard setting, issuing of permits and effective enforcement at the national and local level;

b. dissemination of information to water users at all levels on, inter alia, ecosystems, the water cycle, water quality protection, source control measures and water-borne disease control;

c. awareness building on ecological and water quality issues at all levels;

d. maintenance of laboratory equipment through regular servicing of instruments, repair of malfunctioning equipment and advance procurement of essential spares;

e. development of water quality assessment capabilities of water management authorities through cooperative studies or twinning arrangements;

f. operation and maintenance of water pollution control installations, including regular efficiency verification, advance procurement of essential spare parts and regional coordination of manufacturing services;

g. establishment of a permanent, multi-sectoral follow-up evaluation mechanisms for the planning and management of water resource developments, including hydrological as well as water quality aspects.

19. The New Delhi Statement concludes that "if costs were halved and financial resources at least doubled, universal coverage could be within range by the end of the century." (See also United Nations General Assembly resolution A/RES/45/181.)

20. See also chapters IV.2 on Transfer of environmentally sound technology and IV.4 on Promoting of education, training and public awareness.

21. See also chapter IV.5 on Capacity building in developing countries.

22. See also chapter I.7 on Promoting a sustainable pattern of human settlements.

23. See also chapter II.13 on Environmentally sound management of solid wastes.

24. Cost estimates for drinking water supply and basic sanitation in rural areas are already included in programme are D.

25. The cost estimates for water-based agricultural development activities include irrigation schemes, rainfed agriculture, livestock supply, inland fisheries and aquaculture in a total of 130 developing countries.

26. The impacts of climate change on freshwaters are costed with regard to sea level rise, droughts and increased flood risks.